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**WATERSHED PLAN AND
ENVIRONMENTAL IMPACT STATEMENT**

Boulder River Watershed

Jefferson County, Montana



Prepared under the authority of the Watershed Protection and
Flood Prevention Act (Public law 566, 83rd. Congress, 68 Stat. 666) as amended.

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WATERSHED PLAN AND
ENVIRONMENTAL IMPACT STATEMENT
BOULDER RIVER WATERSHED
Jefferson County, Montana

NOV 29 1978

CATALOGING - PREP.

Prepared under the Authority of the Watershed
Protection and Flood Prevention Act, Public
Law 83-566, as amended (16 USC 1001-1008) and
in accordance with Section 102(2)(C) of the
National Environmental Policy Act of 1969,
Public Law 91-190, as amended (42 USC 4321 et seq).

Prepared by: North Boulder Drainage District

Jefferson Valley Conservation District

With assistance by:

U. S. Department of Agriculture, Soil Conservation Service

U. S. Department of Agriculture, Forest Service

March 1976



PREFACE

Enclosed are two documents--the Watershed Plan and Environmental Impact Statement for Boulder River Watershed, Montana.

The Watershed Plan has been developed by the local sponsors with the assistance of the U. S. Department of Agriculture and is the basis for the authorization of federal assistance to implement the proposed project in accordance with the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008). The Watershed Plan has been briefed to avoid excessive duplication with information required in the Environmental Impact Statement.

The Environmental Impact Statement has been prepared by the U. S. Department of Agriculture in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

The Environmental Impact Statement contains the detailed information on project area, planned project, problems, impacts, alternatives, maps, etc.

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WATERSHED PLAN

BOULDER RIVER WATERSHED

Jefferson County, Montana

BOULDER RIVER WATERSHED PLAN
Jefferson County, Montana

S U M M A R Y O F P L A N

The Boulder River Watershed is in central Jefferson County in southwestern Montana. The watershed originates about 25 miles downstream from the headwaters of the Boulder River and about one mile west of Boulder. The Boulder River is the main watercourse in the basin with the Little Boulder River its principal tributary. See Figure 9, Project Map, Appendix B, Environmental Impact Statement (EIS). The Boulder River Watershed contains 223,600 acres (about 350 square miles). The watershed encompasses most of the lower portion of the Boulder River Basin.

This plan was developed and sponsored by North Boulder Drainage District and Jefferson County Conservation District.

Technical assistance was provided by the Soil Conservation Service and Forest Service, U. S. Department of Agriculture.

WATERSHED PROBLEMS

The principal problem is a shortage of mid and late season irrigation water in the Boulder River valley. Excess water is available early in the irrigation season and severe deficits occur during the remainder of the season. Inefficient use of water results from poor distribution and excessive application during periods of high spring river flows. Ranchers have been hesitant to rehabilitate existing irrigation systems or to expand the system to irrigate available dry cropland.

There is a need for water-based recreational facilities in the vicinity of Boulder. Residents in the community now travel a minimum of 45 miles for water-based recreational activities such as boating. There is a need to strengthen economic conditions in the community through increased tourist trade. There is a need to provide water-based recreational opportunities for residents and visitors of the Boulder River School and Hospital.

During low flow periods numerous irrigation diversions dewater reaches of the Boulder River. As a result, benthic organisms suffer and fish populations are decreased.

Some floodwater damages occur along the Boulder River and Little Boulder River, particularly during spring runoff. Damages are confined primarily to agricultural lands and roads.

PROJECT OBJECTIVES

The objectives of this project are to:

- (1) provide watershed protection for 223,600 acres in the Boulder River Watershed through land treatment and structural measures;
- (2) rehabilitate the present irrigation distribution system, alleviate water shortages, and increase irrigation efficiencies, thereby:
 - a. eliminating irrigation water shortages on 4,500 acres;
 - b. allowing ranchers to shift irrigation from 2,800 acres of Class IV, V, and VI land to Class II and III land;
 - c. expanding the total irrigated area in the watershed from 7,300 acres to 10,700 acres;
- (3) provide permanent water storage of 2,700 acre-feet for recreation and a developed recreational area of 285.5 acres; and
- (4) provide water for stream fishery enhancement on about 30 miles of the Boulder River.

Meeting these objectives will stabilize ranching operations in the valley, improve fish and wildlife habitat, provide widespread public recreation benefits, and protect soil and water resources in the watershed.

MEASURES TO BE INSTALLED

Land treatment measures to be installed are those that will improve the distribution, application, and disposal of irrigation water on ranches and improve the management of forested lands and rangelands. The estimated total installed cost of all land treatment measures is \$2,627,740.

Structural measures to be installed include: a multipurpose reservoir on the Little Boulder River; delivery canals and appurtenant structures; and public recreational facilities adjacent to the reservoir. The multipurpose reservoir will have a total storage capacity of 15,000 acre-feet with 350 surface acres. The minimum permanent recreational pool will have 2,700 acre-feet with 165 surface acres. The average summer pool will be 278 acres. A total of 300 acre-feet of storage is provided for the 100-year sediment accumulation. There will be 9,900 acre-feet allocated for irrigation storage and 2,100 acre-feet allocated to dual use for irrigation and fish and wildlife (12,000 acre-feet of irrigation water storage). The dam will be a

zoned earth fill 99 feet high and 3,170 feet long at the top. This structure will have a clay core with a gravel and cobble shell protected by riprap on the upstream slope. The dam will control a drainage area of 58 square miles.

Total cost of the structural measures, including project administration cost, is \$6,929,100, of which \$3,998,520 will be paid by P. L. 566 funds and \$2,930,580 by other funds. Total project costs, including land treatment, are \$9,556,840. The measures will be installed during a seven-year project period.

PROJECT EFFECTS INCLUDING ENVIRONMENTAL IMPACTS

The project will provide a reliable water supply for cropland in the Boulder River valley, opportunities for public water-based recreation, and fish and wildlife enhancement. The multipurpose reservoir will provide 12,000 acre-feet of irrigation water for 10,700 acres in the Boulder River valley. Land treatment measures, along with an improved canal delivery system, will increase irrigation efficiencies and improve the overall use of water resources. Average hay yields will be increased from 2.5 tons per acre to 4.25 tons per acre. Livestock production efficiencies will be improved through better pasture and hayland management made possible by having a dependable full season irrigation water supply. Employment in the watershed is expected to increase by about 11.9 man-years annually after the project is constructed.

The irrigation canal delivery system is planned to provide fish and wildlife habitat benefits through the joint use of water. Water will be allowed to bypass the main irrigation diversion and to be transported by the Boulder River channel to irrigated lands in the lower part of the valley. This will eliminate four miles of dry stream channel in August. Minimum flows on the Boulder River during average years are expected to exceed 12 cubic feet per second (cfs). Fish production in the Boulder River is expected to improve throughout a 30-mile reach of the river. The need for a number of irrigation diversion structures on the Boulder River will be eliminated by the planned canal system. Water quality will be improved in the Boulder River.

The dam and reservoir will occupy 380 acres of land, of which 350 acres will be available for public recreation when the reservoir is full. Reservoir construction will require relocation of three families (10 persons), including one farm business. Two families have the option of relocating on remaining land which overlooks the reservoir basin. One family will be required to look for new property. The reservoir will inundate 3.6 miles of stream fishery on the Little Boulder River. Reservoir construction will require 3.4 miles of new road construction to relocate 3.4 miles of existing road. Road relocations will closely

follow existing road alignments. Travel distances will not be increased. Utility relocations will include construction of 1.9 miles of 69 KV powerline and 0.75 mile of 12.5 KV powerline. Project construction is expected to create 99 man-years of employment during the installation period.

Flows on the Little Boulder River for 1.6 miles below the dam will be reduced from an average minimum flow of about four cubic feet per second (cfs) to one cfs except during the irrigation season when flows will be about 10 cfs. Stream fishery will be reduced in this reach. Floodwater and sediment damages on the Little Boulder River will be eliminated in the 1.6-mile reach below the reservoir.

Public recreation facilities are planned for a 285.5-acre area around the reservoir. Facilities will include picnic tables, roads, water system, and sanitary facilities. Reservoir construction will require the relocation of a day camp used by the Boulder River School and Hospital. An area will be developed adjacent to the public recreation area to relocate the day camp. Recreational facilities are expected to provide 35,130 days of recreational use annually, including opportunities for visitors at the Boulder River School and Hospital. Annual fisherman use in the watershed, including the reservoir, will increase by 7,560 days.

PROJECT INSTALLATION

Structural land treatment measures will be installed during a seven-year period. Engineering services and land rights acquisition will begin the first year. Construction activities, including seeding, fencing, and restorative work will be concluded by the fifth year.

OPERATION, MAINTENANCE AND REPLACEMENT

The North Boulder Drainage District will be responsible for carrying out operation, maintenance, and replacement of structural works of improvement. Average annual operation, maintenance, and replacement costs are estimated at \$44,500, which includes \$16,900 for operation, maintenance, and replacement of recreational facilities.

BENEFITS AND COSTS

The total average annual benefits from all structural measures are estimated at \$674,180. The average annual costs for these measures are estimated at \$449,800. The ratio of benefits to costs is 1.5 to 1.0.

P L A N N E D P R O J E C T

Conservation land treatment measures on private land in the watershed will be carried out by cooperators of the Jefferson Valley Conservation District. Conservation plans, prepared by the landowners with technical assistance provided by the Service, will outline those conservation practices that are considered necessary to the success of the project.

The planned measures will include a 15,000 acre-feet multipurpose reservoir on the Little Boulder River, recreational facilities, improvement and expansion of the irrigation water canals and distribution systems, road and powerline relocations, and land treatment measures.

The multipurpose reservoir will be formed by a zoned earth and rock fill dam 99 feet high, having a crest length of about 3,170 feet. A county road will be located across the top of the dam. The exposed upstream face of the dam will be protected by rock riprap.

The spillway system will consist of an excavated rock emergency spillway with a reinforced concrete side channel outlet capable of discharging 750 cfs prior to operation of the excavated rock spillway.

Irrigation releases will be from a low level conduit through the dam.

A network of canals, concrete structures, and pipelines will be constructed along both sides of the Boulder River to deliver and distribute the irrigation water to the irrigated area. The system will extend about 30 miles downstream from the proposed reservoir and include 36.1 miles of canal construction.

About 3.4 miles of new road construction will be required as a result of the project to relocate 3.4 miles of existing road. Road relocations around the upper reservoir and in the vicinity of the dam will closely follow existing road alignments. Travel distances will not be increased. About 1.9 miles of 69 KV powerline and 0.75 mile of 12.5 KV powerline owned by Montana Power Company will be relocated. See Figure 8, Project Area Map, Appendix B, EIS.

A 285.5-acre recreational development, including facilities for picnicking, fishing, and boating, will be constructed as part of this project. Designs for facilities will include provisions for the physically handicapped.

PLATE 1



SCS Photo

Hay production in the Boulder Valley is limited by a shortage of late season irrigation water.



SCS Photo

PLATE 2



Livestock in the Boulder
River Valley require
plentiful hay supplies
for winter feed.

SCS Photos



PLATE 3



Sprinkler irrigation systems are being developed in the lower Boulder River Valley where water supplies are more dependable.

SCS Photos



SCS Photo

PLATE 4



June 6, 1974, 1,080 cfs

SCS Photo

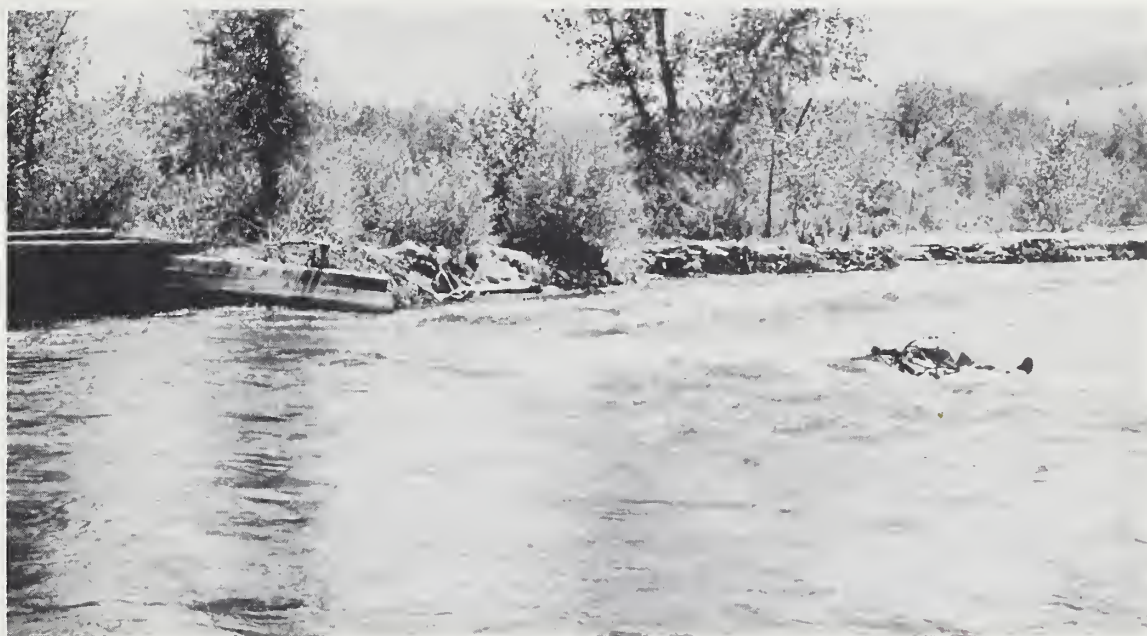
Streamflow data have been recorded on the Boulder River at the U. S. Geological Survey station for more than 42 years. See Figure 6 for location of gaging station #1.



August 1, 1973, 15 cfs

SCS Photo

PLATE 5



High water, June 1974

SCS Photo

Large fluctuations in river stages create water management problems.



July 17, 1973

SCS Photo

This irrigation diversion is located just above SCS gaging station #2. See Figure 6 for location. Irrigation diversions annually dry up about 12 miles of the Boulder River.

PLATE 6



SCS gaging station 4, July 17, 1973, 4 cfs

SCS Photo

Low summer flows in the Boulder River are now inadequate for irrigation or fish and wildlife needs. See Figure 6 for location.



SCS gaging station 5, July 17, 1973, no flow

SCS Photo

PLATE 7



SCS gaging station 6, July 13, 1973--no flow

SCS Photo

Late summer irrigation needs cannot be met due to low flow or dry stream conditions. Fish and wildlife also suffer.



SCS gaging station 8, September 13, 1974, 1.1 cfs

SCS Photo

PLATE 8



SCS Photo

Spring snowmelt runoff has been the principal cause of flooding on the Little Boulder River. Fences, roads, culverts, and pastures are damaged. The proposed dam will eliminate these flooding conditions.



SCS Photo

Lack of late season water causes overirrigation in the spring and early summer. This often results in erosion and ponded water.





Panoramic view of proposed reservoir basin, including the dam site, on the Little Boulder River. View is taken from proposed vista point on right abutment. Recreational facilities will be located around the reservoir.

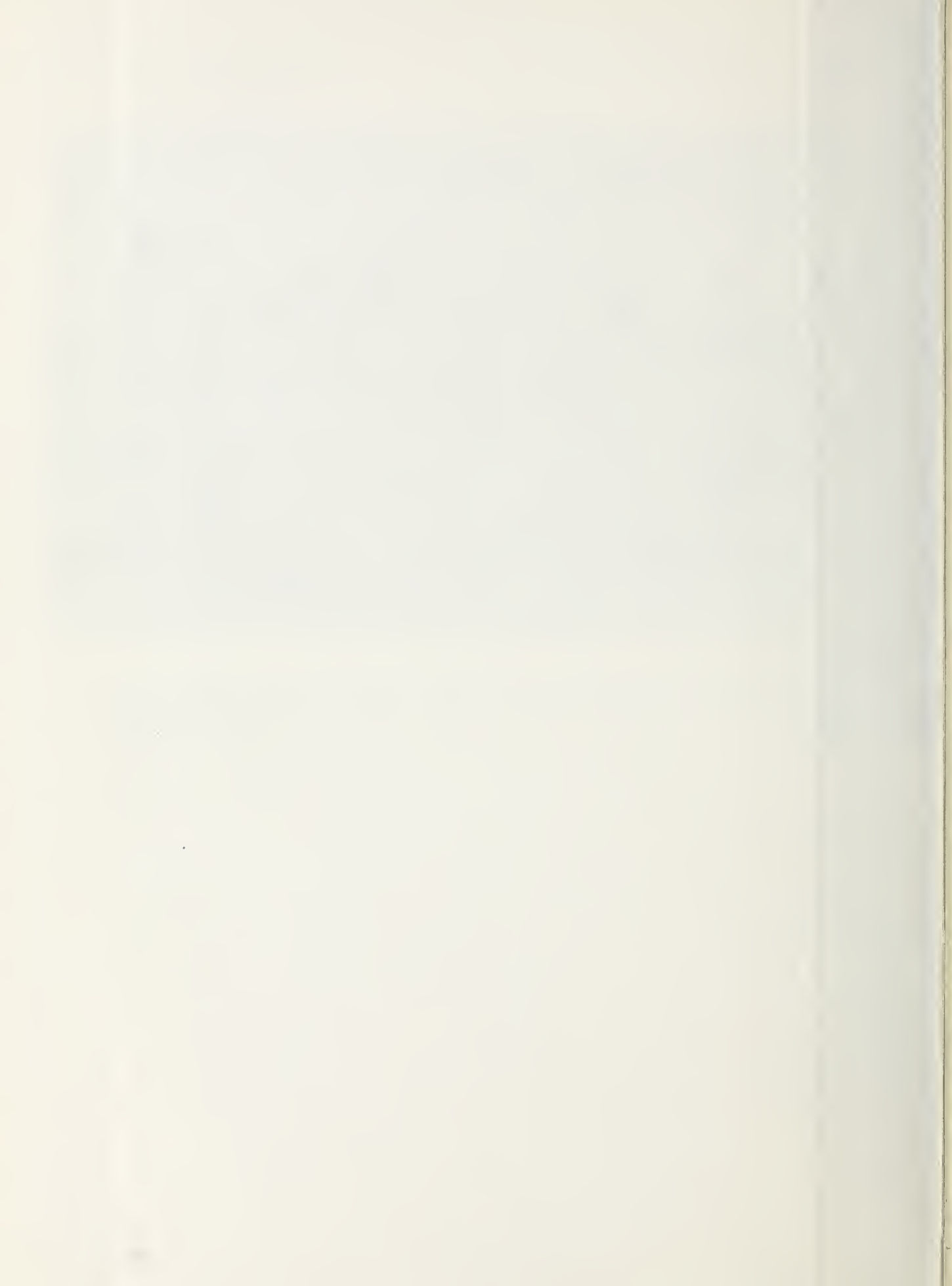




Photo by: Montana Department of Highways, Nov. 1971

PLATE 10

AERIAL VIEW OF BOULDER RIVER VALLEY

Alignment of Irrigation Canals, and Areas to be Irrigated

INSTALLATION COSTS - MONETARY

LAND TREATMENT MEASURES

The installed cost of land treatment measures shown in table 1 totals \$2,627,740. This total represents both application and technical assistance costs.

The estimated cost of land treatment measures, including technical assistance, to be applied to private grazing and cropland is \$2,625,690. Total technical assistance costs are estimated at \$84,640, of which \$60,890 will be accelerated technical assistance during the project period.

Total estimated cost for application of land treatment measures on forested land is \$2,050.

Accelerated technical assistance costs will be provided from Public Law 566 funds. Other technical assistance costs will be provided under going programs of the Soil Conservation Service and Forest Service.

The application costs of all land treatment measures will be met by other funds with cost sharing to individual ranchers as may be available from going programs.

STRUCTURAL MEASURES

The project costs of structural measures include the cost of construction, engineering services, relocation payments, land rights, and project administration. See table 1 and table 2. The distribution of costs for all structural measures is shown in table 2A.

Construction

Construction costs for the multipurpose reservoir amount to \$3,343,000. The construction cost of the irrigation canals and appurtenant structures is estimated at \$1,197,000. This construction estimate includes the cost of clearing rights-of-way, excavation, disposal of spoil materials, and revegetation of disturbed areas. The construction cost of the recreational facilities is estimated at \$116,700. Construction costs total \$4,656,700 and include a contingency allowance of 15 percent to provide for unforeseen costs.

Engineering Services

The cost of engineering services, estimated at \$558,800, includes the direct cost of engineers and other technicians for surveys, investigations, design and preparation of plans, and specifications for structural measures, including the associated vegetative work.

Project Administration

There are \$982,300 of project administration costs associated with the installation of structural measures, including the cost of contract administration, review of engineering plans by others, government representatives, construction surveys, necessary inspection service during construction to insure that structural measures are installed in accordance with plans and specifications, and administrative functions in connection with relocation payments such as serving notice of displacement, providing appropriate application forms, assisting in filing application forms, hearing and resolving grievances, and making relocation payments. The Service and Sponsoring Local Organization will each bear the cost of Project Administration which it incurs, estimated at \$954,700 and \$27,600, respectively. Included in the sponsor's cost are \$4,300 for relocation assistance advisory services and \$23,300 for contract administration.

Relocation Payments

The cost of relocation payments to be made under provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 is estimated at \$42,900. This includes moving and related expenses, household moving, and replacement housing costs for three families (10 persons), including one farm operation.

Land Rights

The total land rights cost for the project is estimated at \$688,400. This cost includes road relocations, land purchases, utility relocations, canal right-of-way, and \$12,900 for associated costs of surveys, legal fees, etc.

Land rights costs for the multipurpose reservoir development are estimated at \$412,400, including \$54,250 for the developed recreational area. Of the total 823.75 acres required for the multipurpose reservoir development, 621.25 acres will be acquired in fee title, and 202.5 acres by special use permit--Bureau of Land Management (130.0 Ac.) and Forest Service (72.5 Ac.). Of the lands acquired in fee title, 541.25 acres will be from private owners and 80 acres from the State of Montana. The dam and reservoir will require 538.25 acres, including 95 acres of special use permits and 443.25 acres of fee land. The developed recreational area will require 285.5 acres, including 107.5 acres of special use permits and 178 acres of fee land.

Land rights for canals and appurtenant structures are estimated at \$148,500 for right-of-way and \$127,500 for road crossings for a total of \$276,000.

Utility relocations around the multipurpose reservoir are estimated to cost \$21,000. These utility relocations will include construction of 1.9 miles of 69 KV powerline and 0.75 mile of 12.5 KV powerline. About 2.3 miles of road will be constructed to restore access to the valley

of the Little Boulder River above the reservoir at an estimated cost of \$145,000. County road relocation (1.1 miles) in the vicinity of the dam is estimated to cost \$52,500.

The cost of relocating the day camp used by the Boulder River School and Hospital from along the Little Boulder River is estimated at \$5,000. The camp will be reestablished on National Resource land adjacent to the developed recreational area. See Figure 7, Appendix B, EIS. Access will be provided from roads developed to serve the recreational area.

C O S T A L L O C A T I O N

Cost of structural measures are allocated to project purposes according to the use of the structures as shown in table 2A. The installation costs of the irrigation canals and appurtenant structures are allocated to irrigation. Installation costs of recreational facilities are allocated to recreation.

Joint structural costs of the multipurpose reservoir, not including land rights or project administration, are allocated by the use of facilities method based on the acre-feet of capacity assigned to each purpose. The storage capacity allocated to irrigation is 10,950 acre-feet (74.5 percent); the allocated capacity for recreation is 2,700 acre-feet (18.4 percent); and the allocated capacity for fish and wildlife is 1,050 acre-feet (7.1 percent). Joint structural costs allocated to irrigation, recreation, and fish and wildlife are \$2,821,400, \$696,800, and \$268,900, respectively, for a total of \$3,787,100.

Land rights costs for the multipurpose reservoir are allocated by the differences in area method. The allocation is based on comparisons of water surface acres of beneficial use pools and acres required for installing the dam and reservoir.

C O S T S H A R I N G

Installation costs will be shared between the local sponsors and the federal government according to the requirements of Public Law 566 as amended and Policy Statement of the Secretary of Agriculture.

Public Law 566 Funds

The following costs will be borne by P. L. 566 funds:

1. Fifty percent of the construction cost of the multipurpose reservoir, estimated at \$1,671,500; 50 percent of the construction cost of the recreational facilities (\$58,350); and 50 percent of the construction cost of the agricultural water management structures (\$598,500).

2. All engineering services associated with the multipurpose reservoir and agricultural water management structures, estimated at \$544,800; and 50 percent of the contracted engineering services costs for the recreational facilities, estimated at \$7,000.
3. Project administration costs, estimated at \$954,700, including construction surveys, construction inspection and quality control, other overhead, and contract administration.
4. A total of 34.4 percent of the cost paid for land rights, including road and utility relocation (excluding acquisition costs, surveys, legal fees, etc.) for the multipurpose reservoir site, estimated at \$120,250; and 50 percent of the cost paid for land rights (excluding acquisition costs, surveys, legal fees, etc.) for the recreational facilities, estimated at \$25,200.
5. A total of 42.5 percent of relocation payment costs, estimated at \$18,220.

Other Funds

The following costs will be borne by other than P. L. 566 funds:

1. Fifty percent of the cost of the multipurpose reservoir, estimated at \$1,671,500; 50 percent of the construction cost of the recreational facilities (\$58,350); and 50 percent of the agricultural water management structures (\$598,500).
2. Fifty percent of the contracted engineering services costs for the recreational facilities, estimated at \$7,000.
3. Project administration costs, including contract administration and relocation assistance advisory service, estimated at \$27,600.
4. A total of 65.6 percent of cost paid for land rights, including utility and road relocations for the multipurpose reservoir, estimated at \$228,850; all of the land rights for canals and appurtenant structures, estimated at \$276,000; 50 percent of the cost paid for land rights for the recreational facilities, estimated at \$25,200; and all acquisition costs, including surveys, legal fees, etc., estimated at \$12,900.
5. A total of 57.5 percent of relocation payments costs, estimated at \$24,680.

EXPENDITURES BY FISCAL YEARS

The estimated expenditure of funds by fiscal years is shown in the table on the following page.

OBLIGATION OF FUNDS BY FISCAL YEARS
BOULDER RIVER WATERSHED

	1st Year		2nd Year		3rd Year		4th Year		5th Year		6th Year		7th Year	
	PL-566	Other	PL-566	Other	PL-566	Other	PL-566	Other	PL-566	Other	PL-566	Other	PL-566	Other
Land Rights														
Multipurpose Reservoir	56,500	115,500	63,750	122,400										
Canals and Appurtenances				65,000		105,500		105,500						
Recreational Facilities							25,200	29,050						
Construction														
Multipurpose Reservoir			824,500	824,500	824,500	824,500	22,500	22,500						
Canals and Appurtenances					288,500	288,500	288,500	288,500	21,500	21,500				
Recreational Facilities									58,350	58,350				
Engineering Services														
Multipurpose Reservoir	220,000		181,200											
Canals and Appurtenances			73,500		70,100		7,000	7,000						
Recreational Facilities														
Relocation Payments														
Multipurpose Reservoir	9,110	12,340	9,110	12,340										
Project Administration			293,800	8,500	293,800	8,500	293,800	8,500	73,300	2,100				
Subtotal	285,610	127,840	1,445,860	1,032,740	1,476,900	1,227,000	637,000	461,050	153,150	81,950	-0-	-0-	-0-	-0-
Land Treatment Measures	3,000	128,300	3,000	128,300	6,100	256,700	12,200	513,400	12,200	513,400	12,200	513,400	12,190	513,350
TOTAL	288,610	256,140	1,448,860	1,161,040	1,483,000	1,483,700	649,200	974,450	165,350	595,350	12,200	513,400	12,190	513,350

March 1976

E C O N O M I C B E N E F I T S
P R I M A R Y B E N E F I T S

LAND TREATMENT MEASURES

Benefits from land treatment measures will accrue from improved on-farm irrigation efficiencies, improved livestock distribution and feed and forage balance, and better conservation of water and land resources. The installation of land treatment practices is essential to the full realization of benefits from structural measures.

STRUCTURAL MEASURES

Irrigation

Average annual gross benefits from providing an adequate, dependable supply of irrigation water were reduced by the associated cost of land treatment. Net average annual irrigation benefits from structural measures are estimated at \$466,900.

Recreation

Average annual benefits from trout fishing on the reservoir and at the irrigation outlet below the dam were estimated by the U. S. Fish and Wildlife Service to be \$37,800. These benefits are based on \$5 per fisherman day. Recreation benefits in the form of boating, hiking, picnicking, nature walks, and other associated outdoor activities are estimated at \$70,300, based on \$2.00 per visitor day. Total average annual recreation benefits are estimated at \$108,100.

Fish and Wildlife

Benefits to trout spawning, feeding, and resting areas will occur from the 2,100 acre-feet of dual-use water in the reservoir and its release downstream in the Boulder River. Additional benefits will be realized in the form of resting area for migrating waterfowl and an increase in the quality of the fishing experience. The U. S. Fish and Wildlife Service and the Montana Department of Fish and Game have assessed the benefits to at least equal the costs of providing this fish and wildlife water.

S E C O N D A R Y B E N E F I T S

Local secondary benefits in the form of increased sales of consumer goods stemming from increased production, recreation, and fish and wildlife use are estimated at \$57,500. Local secondary benefits induced by increased production costs in the form of increased sale of feed, seed, fuel, fertilizer, etc., are estimated at \$41,680.

U N E V A L U A T E D B E N E F I T S

Benefits from the overall improvement in wildlife habitat through land treatment and structural measures and increased economic stability in the watershed are recognized but not evaluated. Flood prevention benefits on the Little Boulder River below the proposed multipurpose reservoir are recognized but unevaluated.

Benefits in the form of increased employment opportunities will accrue to unemployed and underemployed persons in this Economic Development Administration Title 4 county. These benefits are recognized but not evaluated.

C O M P A R I S O N O F B E N E F I T S A N D C O S T S

Total average annual benefits from structural measures are estimated at \$674,180. Total average annual costs of these structural measures are estimated at \$449,800.

The ratio of total average annual benefits to total average annual costs is 1.5 to 1.0. The ratio of benefits to costs without the inclusion of \$99,180 of local secondary benefits is 1.3 to 1.0. Secondary benefits from a national viewpoint are not considered pertinent to the economic evaluation. Benefits and costs for structural measures are itemized in tables 4 and 6.

I N S T A L L A T I O N A N D F I N A N C I N G

Structural measures and land treatment measures of the project will be installed during a seven-year installation period. Land rights will be obtained during the first two years after authorization of operations has been granted. The multipurpose reservoir will be constructed during the first three years. Construction of the delivery canals and appurtenant structures will be carried out during the second to fourth years. Recreational facilities will be installed during the fourth and fifth years. Fish stocking in the reservoir will be carried out prior to completion of construction of the recreation facilities through agreement with the Montana Department of Fish and Game. Land treatment measures on the irrigated lands will be installed with the aid of technical assistance beginning at the start of construction of structural measures and will be completed within the shortest practical time for realization of full benefits. Installation of land treatment measures on dry cropland and rangeland will be continued at the current rate in order to insure the best continued use of these resources. The table on page P-11 showing Obligation of Funds by Fiscal Years provides a schedule for construction and the application of land treatment measures during the project installation period.

INSTALLATION RESPONSIBILITIES

LAND TREATMENT MEASURES

Land treatment measures will be installed on private lands by individual landowners and operators. Technical assistance for the application of these measures on private nonforested land will be provided by the Jefferson Valley Conservation District. Technical assistance for the application of practices on private forest land will be provided by the Division of Forestry, Montana Department of Natural Resources and Conservation, in cooperation with the Forest Service through the going Cooperative Forest Management Program.

The installation of land treatment measures on National Forest land will be the responsibility of the Forest Service and handled as a part of the regular national forest programs.

The Bureau of Land Management concurs in the land treatment program on National Resource lands.

The responsibilities of the Jefferson County Conservation District will include:

1. Obtaining agreements from owners of not less than 50 percent of the land above the reservoir to carry out conservation measures as outlined in individual conservation plans developed for their lands prior to the beginning of construction.
2. Providing leadership in an education program that will result in the application and management of land treatment measures essential to the success of this project.
3. Encouraging the development and use of conservation plans on the maximum practical percentage of lands in the watershed to create a conservation demonstration area.

STRUCTURAL MEASURES

The installation of all structural measures, including necessary land rights arrangements, will be the responsibility of the North Boulder Drainage District. The District will be responsible for all contracting and will be responsible for dealing with the SCS during installation. The District will be responsible for establishing a financial management system, including financial reporting requirements, meeting the requirements as listed in the Federal Management Record 74-7. Road relocations will be carried out in cooperation with the Jefferson County Commissioners, U. S. Forest Service, and Bureau of Land Management. The road relocation, reservoir site preparation, and construction of recreational facilities will be carried out by the

local sponsoring organization as a portion of their share of the installation costs. The amount and value of such works shall be determined by mutual agreement immediately prior to the signing of the appropriate agreement and will be set forth therein. Federal assistance for installing the structural works of improvement as described in this plan will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666), as amended. Under this authority the Soil Conservation Service will provide: (1) engineering services including surveys, site investigations, design and preparation of plans and specifications, except contracted engineering services for recreational facilities which will be done by a qualified consulting firm; (2) project administration, including review of engineering plans prepared by others, government representatives, construction surveys, necessary inspection services during construction, administrative functions connected with relocation payments, and contract administration.

The North Boulder Drainage District will, as a part of project administration, provide relocation assistance advisory services and the contract administration costs they bear.

The Service will assist the North Boulder Drainage District in fulfilling their responsibilities as outlined above.

The relocation assistance advisory services program of the North Boulder Drainage District shall include such measures or facilities as necessary or appropriate, without PL-566 financial assistance, in order to:

- (1) Determine the need, if any, of displaced persons for relocation assistance;
- (2) Provide current and continuing information on the availability, prices, and rentals of decent, safe, and sanitary sale and rental housing, and of commercial properties and locations for displaced businesses and farm operations;
- (3) Assure that, within a reasonable period of time prior to displacement, replacement dwellings will be available;
- (4) Assist a person displaced from his business or farm operation in obtaining and becoming established in a suitable replacement location;
- (5) Supply information concerning housing programs, disaster loan programs, and other federal or state programs offering assistance to displaced persons;
- (6) Provide other advisory services to displaced persons in order to minimize hardships to such persons in adjusting to relocation;

(7) Advise displaced persons that they should notify the displacing agency before they move; and

(8) Prior to initiation of acquisition, provide persons from whom it is planned to acquire land a brochure or pamphlet outlining the benefits to which they may be entitled.

Other administrative functions to be provided as needed by the North Boulder Drainage District will include such items as: (1) providing by first-class mail written notice of displacement and appropriate application forms to each displaced person, business, or farm operation; (2) assistance in filing applications; (3) reviewing and taking action on applications for assistance; (4) reviewing and processing grievances; and (5) making relocation payments.

Displaced persons will be given at least 90 days' notice prior to the date they must vacate their present dwellings. If decent, safe, and sanitary housing is not available, arrangements will be made by the North Boulder Drainage District for the construction of new dwellings on remaining or replacement lands.

Portions of the canal delivery system will be located on National Resource lands. Canal designs and necessary location maps will be submitted to the Bureau of Land Management by the sponsors for review and approval prior to the issuance of a special use permit for construction.

Functional designs and locations of the reservoir, dam, and emergency spillway, along with necessary location maps, will be submitted to the Forest Service and the Bureau of Land Management by the sponsors for review and approval prior to the issuance of a special use permit for construction.

Plans for road and powerline relocations will be submitted to the Bureau of Land Management, Forest Service, and Jefferson County Commissioners by the sponsors for review and approval prior to construction.

The Service will assist the sponsors in developing a reservoir management plan. The Service will establish necessary streamflow measuring devices on the Little Boulder and Boulder Rivers. The Snow Survey and Water Supply Forecasting Unit will continue to collect, analyze, and make available hydrometeorologic data.

The following conditions shall be met before issuance of invitations to bid on any portion of construction:

1. The necessary acquisition of land rights will be assured by the North Boulder Drainage District. The District has sufficient legal authority to acquire the needed land rights and agrees to use such authority if necessary. Therefore, federal

assistance for construction may be provided before all land rights are obtained for the entire project. In such cases, specific agreements for obtaining all necessary land rights shall be reached and the willingness of the sponsors to exercise their authority reaffirmed.

The acquisition of all lands, easements, or rights-of-way shall be made in compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, PL-91-646, and appropriate USDA and federal regulations. These provide that in cases where land rights are not obtained by donation or land exchange, every reasonable effort will be made to acquire real property rights by negotiation. Prior to the initiation of negotiations, an appraisal of the fair market value of the real property interest will be made by a qualified land appraiser.

2. The necessary water rights or water use permits as required by state law will be obtained by the North Boulder Drainage District.
3. Mutual agreement on the schedule for construction and on plans and specifications shall be reached. Terms of contracts and all matters pertaining to contracts for works of improvement shall be mutually satisfactory and in accord with requirements of the sponsoring local organization and in agreement with Soil Conservation Service technical and administrative requirements.
4. Full conformance with local, state, and federal laws and regulations shall be the responsibility of the local sponsors. Reasonable evidence of such conformity shall be provided to the mutual satisfaction of all parties and at no expenditure of Public Law 566 funds.
5. Agreements for the operation and maintenance of the multipurpose reservoir and irrigation distribution system and appurtenances shall be secured in writing to the mutual satisfaction of the sponsoring local organization and the Service.

M E T H O D S O F I N S T A L L A T I O N

Contracts for the construction of the multipurpose reservoir will be let on a competitive bid basis. Contracts for seeding, canal construction, and recreational facilities will be let either on a competitive basis or under performance of work agreements. Performance of work agree-

ments will be used only on construction items that are simple in scope and character and lend themselves to standardized specifications requiring a minimum of engineering supervision.

Contractors will be required to follow regulations to prevent sedimentation and pollution of stream waters during construction. Construction specifications will require that runoff from borrow and other disturbed areas be routed through sediment settling basins before going into the main channel. Contractors will also be required to install bridges or culverts where it is necessary to cross live stream channels with machinery. Provisions will be made to save topsoil material and spread it back over all areas to be reseeded. Dust control measures will also be required. All SCS safety requirements for construction will be strictly observed.

FINANCING PROJECT INSTALLATION

Project costs to be shared by Public Law 566 funds will be paid out of funds appropriated under the authority of Public Law 566, 83d Congress, 68 Stat. 666, as amended. This work plan does not constitute a financial document for obligation of either federal or other funds, including those of local sponsors. Financial or other assistance to be furnished by the Service in carrying out the plan is contingent on the appropriation of funds for this purpose.

The North Boulder Drainage District is a legally constituted organization under Montana law. They have the power to borrow money for financing the installation of this project, the power of eminent domain, and the power to levy taxes for repayment of borrowed funds and payment of operating expenses. Program income (gross income earned by the sponsors as a result of grant-supported activities) shall be handled in accordance with requirements in the Federal Management Record 74-7.

LAND TREATMENT

The cost of applying land treatment on private nonforested land will be borne by individual landowners or operators in conjunction with assistance as may be provided under going agricultural programs. Technical assistance for land treatment will be provided by the Jefferson Valley Conservation District in cooperation with the Soil Conservation Service from going program funds and from Public Law 566 funds for accelerated assistance.

The cost of technical assistance on private forested land will be met by the State Forester in cooperation with the U. S. Forest Service. To defray part of the cost for installation of these land treatment measures, cost sharing payments are made to individual ranchers under going agricultural programs.

The installation costs on federal forested land, including technical assistance, will be met with going programs of the U. S. Forest Service.

Installation costs on National Resource land will be met with going programs of the Bureau of Land Management.

STRUCTURAL MEASURES

Installation costs other than those allocated to Public Law 566 funds will be the responsibility of the North Boulder Drainage District. The District is seeking funds from the State of Montana through legislative or other appropriations to pay for a portion of local project costs. Negotiations between the District and the Farmers Home Administration are under way, including the filing of a preliminary application for the balance of local project costs. Donations of land, easements, labor, material, equipment, services, or money by the District or others will be used to reduce District's cost of project installation. The prices or value of such work performed, donations, etc., shall be established by negotiations between the Service and the District prior to undertaking the work and will be included in the project agreement or engineering agreement covering the work. A financial settlement will be made between the Service and the District upon completion of the work covered by each project or engineering agreement.

O P E R A T I O N , M A I N T E N A N C E A N D R E P L A C E M E N T

Land treatment measures on private land will be operated and maintained by individual landowners and operators with technical assistance provided by the Service and Montana Division of Forestry. Land treatment on state and federally owned lands will be operated and maintained by the appropriate state or federal agency.

The dam, irrigation delivery system, and recreational facilities will be operated and maintained by the North Boulder Drainage District in compliance with agreements satisfactory to the sponsors and the Service. An operation and maintenance agreement will be executed for each structural measure prior to signing of a land rights, relocation, or project agreement in accordance with the SCS State of Montana Watersheds Operation and Maintenance Handbook and will include specific provisions for retention and disposal of real and personal property acquired in whole or in part with PL-566 funds which will be handled in accordance with the Federal Management Record 74-7. The operation and maintenance of all facilities are to meet the requirements of the State and local public health agencies.

A period of time is prescribed to provide for the establishment of adequate vegetative cover for measures. This "establishment period" applies only to vegetation associated with structural measures. The establishment period terminates when the Service notifies the sponsors that adequate vegetative cover is established or after two growing seasons have elapsed after the initial installation of vegetative measure. During the establishment period for vegetative measures, the Service may approve PL-566 cost-sharing for additional work required to obtain an adequate vegetative cover.

A Service employee, responsible for operation and maintenance inspections and followup, and the local sponsors will make a joint inspection annually, after severe storms, and after the occurrence of any other unusual conditions that might adversely affect the structural measures. These inspections will continue annually for three years following the acceptance of the works of improvement for operation and maintenance by the local sponsors. Inspections after the third year will be made annually by the local sponsors and a written report of conditions and recommended actions will be submitted to the Service employee responsible for seeing that operation and maintenance are carried out. In situations where the sponsors have shown a lack of ability to carry out inspections properly, or there is an indication of need for continued Service assistance, the Service may continue to provide assistance after the third year at the discretion of the State Conservationist.

The Service employee responsible for operation and maintenance inspections and followup will thoroughly review the sponsors' inspection, operation, and maintenance reports. Evidence that inspections or needed maintenance are not being performed properly and promptly will be reported to the State Conservationist, who must then take appropriate action on reported deficiencies.

The operation of structural measures shall include, but not be limited to:

1. Operating the multipurpose reservoir on the Little Boulder River for irrigation water management and recreational use. Stored waters will not be withdrawn below the elevation of the permanent recreational pool except as necessary for repairs and maintenance or operation for recreation, fishery, or wildlife management at the mutual consent of the sponsors and the Soil Conservation Service. The sponsors, with the assistance of the Montana Department of Fish and Game, will develop a recreation management plan to make boating and fishing compatible.
2. Operation of the recreational facilities will be for the use of the general public. If the facilities are operated on a fee basis, the schedule of fees shall be designated to write off capital

investment, operation, maintenance, and replacement costs only, and not as a profit-making venture. Operation of these facilities will include necessary custodial, sanitation, safety, and policing services.

3. Operating the irrigation delivery system, project irrigation pump unit, and pipelines to insure proper distribution and management of irrigation water. The operation of the main irrigation diversion structure on the Boulder River will provide for bypassing a minimum flow of 12 cfs during the irrigation season. During short water years and times when the reservoir does not completely fill, this minimum flow will be adjusted proportionate to the available reservoir storage. Irrigation operations will be conducted such that the Boulder River will not be completely dewatered. Measuring devices will be operated and maintained to assure proper distribution of project water.
4. Operating streamflow measuring and recording stations on the Boulder River and Little Boulder River.
5. Operation of the irrigation outlet works will provide for releases of up to 10 cfs in the Little Boulder River during the irrigation season.

The maintenance of structural measures shall include, but not be limited to:

1. Replacement and repair of water control gates and appurtenant irrigation structures as needed, including project pumping plant and pipelines.
2. Removing trash that collects in the diversion, division boxes, measuring devices, or inverted siphon inlets and outlets.
3. Replacement and repair of tables, grills, latrines, signs, or other appurtenant structures associated with the recreational area.
4. Repair or rebuilding of recreation roads as required.
5. Maintaining or replacing protective vegetative cover, riprap, and fences as needed.
6. Periodic or annual stocking of trout in the multipurpose reservoir by the Montana Department of Fish and Game as deemed desirable by the Department through agreement with the sponsors. It will be the Department's responsibility to control or eradicate rough fish.

See table 4 for estimated operation, maintenance, and replacement costs.

WATERSHED WORK PLAN AGREEMENT

Between the

NORTH BOULDER DRAINAGE DISTRICT

JEFFERSON VALLEY CONSERVATION DISTRICT

(hereinafter referred to as the Sponsoring Local Organization)

State of Montana

and the

Soil Conservation Service
United States Department of Agriculture
(hereinafter referred to as the Service)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsoring Local Organization for assistance in preparing a plan for works of improvement for the Boulder River Watershed, State of Montana, under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666), as amended; and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Service; and

Whereas, there has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service a mutually satisfactory plan for works of improvement for the Boulder River Watershed, State of Montana, hereinafter referred to as the watershed work plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Sponsoring Local Organization and the Secretary of Agriculture through the Service hereby agree on the watershed work plan and further agree that the works of improvement as set forth in said plan can be installed in about seven years.

It is mutually agreed that in installing and operating and maintaining the works of improvement substantially in accordance with the terms, conditions, and stipulations provided for in the watershed work plan:

1. The Sponsoring Local Organization will acquire such land rights as will be needed in connection with the works of improvement. (Estimated cost \$688,400) The percentages of this cost to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Org.</u> (Percent)	<u>Service</u> (Percent)	<u>Estimated Land Rights Cost</u> (Dollars)
Multipurpose Reservoir			
Payment to landowners for about 443 acres	65.6	34.4	125,600
Road and utility relocations*	65.6	34.4	223,500
Legal fees, survey costs and special use permits**	100.0	0.0	9,050
Recreational Facilities			
Payment to landowners for about 178 acres	50.0	50.0	50,400
Legal fees, survey costs, and special use permits**	100.0	0.0	3,850
Canals and Appurtenances	100.0	0.0	276,000

*Includes necessary engineering services, construction, and additional land costs. The Sponsoring Local Organization will provide a portion of their share of the cost by performing road relocation. The quantity and value of such work will be determined by mutual agreement immediately prior to signing of the appropriate agreement and will be set forth in the project or engineering agreement.

**Includes 57.5 acres of federal land for the multipurpose reservoir and 145.0 acres of federal land for recreational facilities.

The Sponsoring Local Organization agrees that all land acquired or improved with PL-566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement.

2. The Sponsoring Local Organization assures that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894), effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsoring Local Organization and the Service as follows:

	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Relocation Payment Costs</u> (dollars)
Relocation Payments	57.5	42.5	42,900

3. The Sponsoring Local Organization will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.
4. The percentages of construction costs (\$4,656,700) of structural measures to be paid by the Sponsoring Local Organization and by the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization*</u> (percent)	<u>Service</u> (percent)	<u>Estimated Construction Cost</u> (dollars)
Multipurpose Reservoir	50.0	50.0	3,343,000
Recreational Facilities	50.0	50.0	116,700
Canals and Appurtenances	50.0	50.0	1,197,000

*The Sponsoring Local Organization will provide a portion of their share of costs through performance of work agreements. The quantity and value of such works will be determined by mutual agreement immediately prior to the signing of the appropriate agreement and will be set forth therein.

5. The percentages of engineering costs (\$558,800) to be borne by the Sponsoring Local Organization and the Service are as follows:

<u>Works of Improvement</u>	<u>Sponsoring Local Organization</u> (percent)	<u>Service</u> (percent)	<u>Estimated Engineering Cost</u> (dollars)
Multipurpose Reservoir	0.0	100.0	401,200
Recreational Facilities, Contracted Services	50.0	50.0	14,000
Canals & Appurtenances	0.0	100.0	143,600

6. The Sponsoring Local Organization and the Service will each bear the costs of Project Administration which it incurs, estimated to be \$27,600 and \$954,700 respectively.
7. The Sponsoring Local Organization will obtain agreements from owners of not less than 50 percent of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.
8. The Sponsoring Local Organization will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed work plan.
9. The Sponsoring Local Organization will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.
10. The Sponsoring Local Organization will be responsible for the operation and maintenance of the structural works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.
11. The costs shown in this agreement represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.
12. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by the Service in carrying out the watershed work plan is contingent on the availability of appropriations for this purpose. A separate agreement will be entered into between the Service and the Sponsoring Local Organization before either party initiates work involving funds of the other party. Such agreement will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

13. The watershed work plan may be amended or revised, and this agreement may be modified or terminated only by mutual agreement of the parties hereto except for cause. The Service may terminate financial and other assistance in whole, or in part, at any time whenever it is determined that the Sponsoring Local Organization has failed to comply with the conditions of this agreement. The Service shall promptly notify the Sponsoring Local Organization in writing of the determination and the reasons for the termination, together with the effective date. Payments made to the Sponsoring Local Organization or recoveries by the Service under projects terminated for cause shall be in accord with the legal rights and liabilities of the parties. An amendment to incorporate changes affecting one specific structural measure may be made by mutual agreement between the Service and the sponsor having specific responsibilities for the particular structural measures involved.
14. No member of or delegate to congress, or resident commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.
15. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 C.F.R. 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.
16. This agreement will not become effective until the Service has issued a notification of approval and authorizes assistance.

North Boulder Drainage District
Boulder, Montana 59632

By Paul J. Smith

Title Chairman

Date May 5 - 1976

The signing of this agreement was authorized by a resolution of the governing body of North Boulder Drainage District adopted at a meeting held on May 5 - 1976.

Jack Dawson
Secretary, North Boulder
Drainage District

Boulder, Mont 59632
Address Zip Code

Date May 5, 1976

Jefferson Valley Conservation District
Box D, Whitehall, Montana 59759

By L. T. Robbins

Title Chairman

Date May 5, 1976

The signing of this agreement was authorized by a resolution of the governing body of the Jefferson Valley Conservation District adopted at a meeting held on May 3, 1976.

Jessie S. Felsheim
Secretary
Jefferson Valley Conservation District

Whitehall, Mt. 59759
Address Zip Code

Date May 5, 1976

Appropriate and careful consideration has been given in this work plan to the environmental impact statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service
United States Department of Agriculture

Approved by:

Wm H. Staderlie
State Conservationist

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5/7/76
Date

TABLE 1--ESTIMATED PROJECT INSTALLATION COST

Boulder River Watershed, Montana

ESTIMATED COST (DOLLARS) ^{1/}										
Installation Cost Item	Unit	Federal Land	Non-Fed. Land	Number	PL-566 Funds			Other Funds		
					Fed. Land	Non-F. Land	Total	Fed. Land	Non-F. Land	Total
LAND TREATMENT										
Land Areas ^{2/}										
Cropland	Acre	9,060	9,060							
Rangeland	Acre	22,440	58,020							
Forest land	Acre	69,100	5,300							
Technical Assistance										
TOTAL LAND TREATMENT										
STRUCTURAL MEASURES										
Construction										
Multipurpose Reservoir	No.	1	1							
Recreational Facilities	No.	1	1							
Canals and Appurtenances	Mi.	0.7	35.4	36.1						
Subtotal Construction										
Engineering Services										
Relocation Payments										
Project Administration										
Construction Inspection ^{4/}										
Other Overhead										
Contract Administration										
Relocation Assistance										
Advisory Services										
Subtotal Administration										
Other Costs										
Land Rights										
Subtotal Other										
TOTAL STRUCTURAL MEASURES										
TOTAL PROJECT										

^{1/} Price Base: 1975^{2/} Includes only areas estimated to be adequately treated during the project installation period. Treatment will be accelerated throughout the watershed, and dollar amounts apply to total land areas--not just to adequately treated areas.^{3/} Federal agency responsible for assisting in installation of works of improvement.^{4/} Includes construction layout and quality control.

March 1976

TABLE 1A--STATUS OF WATERSHED WORKS OF IMPROVEMENT

Boulder River Watershed, Montana

Measures	Unit	Applied To Date	Total Cost (Dollars) <u>1/</u>
<u>LAND TREATMENT</u>			
Conservation Plans	No.	21	13,020
<u>Irrigated Cropland</u>			
Conservation Cropping Systems	Acres	3,955	910
Water Control Structures	No.	128	43,328
Drainage Main	Feet	15,880	11,481
Irrigation Field Ditch	Feet	160,500	19,741
Irrigation Land Leveling	Acres	150	13,732
Irrigation System Surface	Acres	3,705	8,262
Irrigation System Sprinkler	Acres	485	88,794
Irrigation Water Management	Acres	1,145	441
<u>Dry Cropland</u>			
Conservation Cropping Systems	Acres	870	226
<u>Rangeland</u>			
Proper Grazing Use	Acres	54,000	810
Planned Grazing Systems	Acres	54,000	810
Spring Development	No.	50	36,350
Wells	No.	15	16,350
Ponds	No.	10	6,540
Pipelines	Feet	180,000	119,160
Tanks	No.	60	12,460
Fencing	Miles	7	1,108
<u>Forest Land</u>			
Fire Protection	Acres	70,192	200,000
Improved Grazing	Acres	10,000	1,500
Timber Improvement	Acres	100	3,000
Road Construction	Miles	28	305,000
TOTAL	xxxx	xxxxxx	903,023 903,000

1/ Price base 1975

March 1976

TABLE 2--ESTIMATED STRUCTURAL COST DISTRIBUTION
Boulder River Watershed, Montana
(Dollars)^{1/}

Item	Installation Cost: PL-566 Funds				Total PL-566	Installation Cost: Other Funds				Total Installation Cost	
	Construction	Engineering	Land Rights	Relocation Payments		Construction	Engineering	Land Rights	Relocation Payments		Total-Other
Multipurpose Reservoir	1,671,500	401,200	120,250	18,220	2,211,170	1,671,500		237,900	24,680	1,934,080	4,145,250
Recreational Facilities	58,350	7,000	25,200		90,550	58,350	7,000	29,050		94,400	184,950
Canals and Appurtenances	598,500	143,600			742,100	598,500		276,000		874,500	1,616,600
Subtotal	2,328,350	551,800	145,450 ^{3/}	18,220	3,043,820	2,328,350	7,000	542,950 ^{2,3/}	24,680	2,902,980	5,946,800
Project Administration					954,700					27,600	982,300
GRAND TOTAL	2,328,350	551,800	145,450	18,220	3,998,520	2,328,350	7,000	542,950	24,680	2,930,580	6,929,100

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^{1/} Price base 1975

^{2/} Includes \$12,900 for surveys, legal fees, and other costs.

^{3/} Includes \$197,500 for road relocations; \$21,000 for power line relocation; \$127,500 for highway and road crossings; and \$5,000 for relocation of the day camp facilities.

March 1976

TABLE 2B--RECREATIONAL FACILITIES

ESTIMATED CONSTRUCTION COSTS

Boulder River Watershed, Montana

(Dollars) 1/

Item	Number <u>2/</u>	Estimated Unit Cost	Total Construction Cost
1. Picnic tables	32 ea	100	3,200
2. Grills	9 ea	100	900
3. Double latrine	4 ea	3,900	15,600
4. Water well	1 ea	3,900	3,900
5. Road	0.9 mi	40,000	36,000
6. Parking spaces with barriers	124 ea	130	16,120
7. Fence	8 mi	1,950	15,600
8. Cattle guard	1 ea	4,900	4,900
9. Primitive trail	14,000 ft.	.16	2,240
10. Landscaping			
Grass seeding	10 ac	330	3,300
Trees	48 ea	50	2,400
11. Signs			<u>1,940</u>
			106,100
		Contingencies	<u>10,600</u>
		GRAND TOTAL	116,700

March 1976

1/ Price base 19752/ Estimated quantity, subject to minor variation at time detailed planning.

TABLE 3--STRUCTURAL DATA

STRUCTURES WITH PLANNED STORAGE CAPACITY

Boulder River Watershed, Montana

Item	Unit	Number or Kind
Class of Structure		C
Drainage Area (Total)	Sq. Mi.	58.8
Controlled	Sq. Mi.	58.0
Curve No. (1-day) (AMC II)		62
Elevation Top of Dam	Ft.	4917
Elevation Crest Emergency Spillway	Ft.	4907
Elevation Crest Principal Spillway ^{1/}	Ft.	4907
Maximum Height of Dam	Ft.	99
Volume of Fill (above ground)	Cu. Yds.	1,104,000
Total Capacity	Ac. Ft.	15,000
Sediment Submerged ^{2/}	Ac. Ft.	300
Beneficial Use (Recreation)	Ac. Ft.	2,700
Beneficial Use (Irr., Fish & Wildlife) ^{3/}	Ac. Ft.	2,100
Beneficial Use (Irrigation)	Ac. Ft.	9,900
Surface Area		
Sediment pool	Acres	50
Beneficial use pool (Recreation)	Acres	165
Beneficial use pool (Irrigation)	Acres	350
Principal Spillway Design		
Runoff Volume (1 day)	In.	0.32
Runoff Volume (10 day)	In.	2.02
Runoff Volume (60 day)	In.	6.82
Capacity of Low Stage (Max.)	cfs	750
Frequency operation-Emer. Spillway ^{4/}	% chance	<1
Dimensions of Conduit	In.	84
Emergency Spillway Design		
Rainfall Volume (ESH) (areal)	In.	3.84
Runoff Volume (ESH)	In.	0.78
Storm Duration	Hrs.	12
Type		Excavated rock
Bottom Width	Ft.	190
Velocity of flow (V)	Ft./Sec.	7.68
Slope of exit channel	Ft./Ft.	0.04
Max. reservoir water surface elev.	Ft.	4910.16
Freeboard Design		
Rainfall Volume (FH) (areal) (-hrs)	In.	9.35
Runoff Volume (FH)	In.	4.63
Storm Duration	Hrs.	12
Max. reservoir water surface elev.	Ft.	4916.99
Capacity Equivalents		
Sediment Volume	In.	0.097
Beneficial Volume	In.	4.75

^{1/} Crest of Emergency Spillway March 1976^{2/} All sediment will be submerged because there is not a floodwater retarding pool.^{3/} Joint Use (Irrigation; Fish and Wildlife)^{4/} Discharge prior to flow in the emergency spillway will be 1.5 times the 100-year peak discharge.

TABLE 3A--STRUCTURAL DATA

Boulder River Watershed, Montana

IRRIGATION CANALS

Canal	Reach	Required Capacity (cfs)	Canal Gradient (%)	Canal Dimensions			Velocity (fps)
				Bottom (ft)	Flow Depth (ft)	Side Slopes (H. to V.)	
Little Boulder	5+00	215	0.05	12	4.8	1.5:1	2.4
	23+00	215	0.05	12	4.8	1.5:1	2.4
	24+00	215	0.50	12	3.4	0.5:1	4.7
	34+00	215	0.05	12	4.9	0.5:1	3.0
	35+00	215	0.05	12	4.9	2:1	2.0
	47+00	215	0.10	12	4.7	2:1	2.2
	64+00	215	0.10	12	4.7	2:1	2.2
Main West Side	5+00	100	0.10	10	3.1	1.5:1	2.2
	35+60	100	0.05	10	3.7	1.5:1	1.7
	181+00	95	0.05	10	3.6	1.5:1	1.7
	290+00	90	0.05	10	3.5	1.5:1	1.7
	443+00	85	0.05	10	3.4	1.5:1	1.7
	533+00	55	0.05	10	2.7	1.5:1	1.5
	752+00	25	0.05	4	2.6	1.5:1	1.3
	800+00	20	0.05	4	2.3	1.5:1	1.2
	848+00	20	0.05	4	2.3	1.5:1	1.2
Main East Side	0+00	110	0.10	10	3.3	1.5:1	2.3
	64+00	110	0.05	10	3.9	1.5:1	1.8
	101+50	105	0.05	10	3.8	1.5:1	1.8
	231+50	60	0.05	10	2.8	1.5:1	1.5
	366+00	55	0.05	10	2.7	1.5:1	1.5
	413+50	20	0.05	4	2.3	1.5:1	1.2
	498+00	20	0.05	4	2.3	1.5:1	1.2
Upper East Side	200+00	45	0.05	4	3.4	1.5:1	1.5
	271+50	40	0.05	4	3.2	1.5:1	1.4
	410+50	10	0.05	4	1.6	1.5:1	1.0
	532+00	10	0.05	4	1.6	1.5:1	1.0
Lower East Side	0+00	16	0.05	4	2.0	1.5:1	1.1
	110+00	5	0.05	4	1.1	1.5:1	0.8
	173+00	5	0.05	4	1.1	1.5:1	0.8

March 1976

TABLE 4--ANNUAL COST

Boulder River Watershed, Montana

(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost ^{2/}	Operation Maintenance & Replacement Cost	Total
Multipurpose Reservoir, Recreational Facilities, and Canals and Appurtenances	348,100	44,500 ^{3/}	392,600
Fish & Wildlife Features	(17,200)	(1,200)	(18,400)
Project Administration	57,200 (3,100) ^{4/}		57,200 (3,100)
GRAND TOTAL	405,300	44,500	449,800

1/ Price Base: 1975

March 1976

2/ 100 years @ 6-1/8 percent interest3/ Includes \$16,900 for operation, maintenance, and replacement for the recreational development.4/ Costs associated with fish and wildlife features.

TABLE 6--COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Boulder River Watershed, Montana

(Dollars) $\frac{1}{\text{ }}$

Evaluation Unit	AVERAGE ANNUAL BENEFITS $\frac{1}{\text{ }}$			Average Annual Cost	Benefit:Cost Ratio
	Irrigation	Recreation	Secondary		
Multipurpose Reservoir, Canals & Appurtenances, & Recreational Facilities	466,900	108,100	99,180	674,180	392,600 1.7 to 1.0
Project Administration				57,200	
GRAND TOTAL	466,900	108,100	99,180	674,180	449,800 1.5 to 1.0

March 1976

 $\frac{1}{\text{ }}$ Current normalized prices for crop and pasture values & 1975 prices for other values $\frac{2}{\text{ }}$ From table 4

ADDENDUM

March 1976

WATERSHED WORK PLAN
Boulder River Watershed

Jefferson County
Montana

C O N T E N T S

Introduction

Part 1 - Discount Rate Comparison

Part 2 - Display of impacts to national economic development,
environmental quality, regional development, and
social well-being accounts

Part 3 - Display of the abbreviated environmental quality
alternative

INTRODUCTION

This addendum is based on procedures established for application of the Water Resources Council's Principles and Standards to implementation studies in process.

The Boulder River Watershed Work Plan was developed using 1975 installation costs, a 6-1/8 percent discount rate, current normalized prices for agriculture products, and current recreation values in the evaluation of the project structural measures.

Part 1 of this addendum shows the effect of evaluating the structural measures using current installation costs and the current discount rate with and without secondary benefits.

Part 2 of the addendum displays the effects of the selected plan as evaluated for each of the separate accounts--national economic development, environmental quality, regional development, and social well-being. Values for costs, prices, and rates are those of the work plan.

Part 3 of the addendum displays an abbreviated alternative plan developed to emphasize environmental quality. Bases for costs, prices, and rates are those of the work plan.

DISCOUNT RATE COMPARISON

The work plan shows an evaluation of the project structural measures using 1975 installation costs and a discount rate of 6-1/8 percent. No further comparison is applicable.

Average annual costs, benefits, and the benefit:cost ratio are as follows:

1. Average annual costs are \$449,800.
2. Average annual benefits:
 - a. with secondary benefits included are \$674,180.
 - b. without secondary benefits included are \$575,000.
3. The benefit:cost ratio:
 - a. with secondary benefits included is 1.5 to 1.0.
 - b. without secondary benefits included is 1.3 to 1.0.

SELECTED ALTERNATIVE
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT
Boulder River Watershed, Montana

<u>Components</u>		<u>Measures of Effects</u> ^{1/}	<u>Measures of Effects</u> ^{1/}
<u>- - - Dollars - - -</u>		<u>- - - Dollars - - -</u>	<u>- - - Dollars - - -</u>
Beneficial effects:			
A.	The value to users of increased outputs of goods and services		
1.	Agricultural water management	466,900	
2.	Recreation	108,100	
		<u>575,000</u>	
	Total beneficial effects		348,100
			57,200
			44,500
			<u>(21,500)</u>
			449,800
			125,200

SELECTED ALTERNATIVE
ENVIRONMENTAL QUALITY ACCOUNT
Boulder River Watershed, Montana

Components

Beneficial and adverse effects:

A. Areas of natural beauty

1. An increase of about 3,400 acres of irrigated land, making more green area in the watershed.
2. Creation of a clear water reservoir with a permanent water surface of 165 acres.
3. Visual impacts of the dam and reservoir to lower portions of the Little Boulder River Watershed.
4. The exposure of minor slump areas and nonvegetated shorelines when the irrigation storage is removed from the upper portion of the reservoir.
5. The creation of unsightly borrow areas above the high water line on the northern shore of the reservoir until vegetation becomes established.

B. Quality considerations of water, land, and air resources

2. The shift of 2,800 acres of Class IV, V, and VI irrigated hayland to pasturelands.
3. The shift of 5,700 acres of Class II and III dry cropland to irrigated alfalfa hay.
4. A reduction of overflow conditions on bottomlands.
5. A reliable irrigation water supply for 10,700 acres of cropland.
6. A more efficient use of surface waters in the project watershed.
7. The reduction of Little Boulder River flows below the reservoir (1.6 miles) to one cfs.
8. Blockage of ground-water recharge to the Little Boulder River below the dam.
9. Smoke, dust, noise, and sediment will increase during project construction.

SELECTED ALTERNATIVE
ENVIRONMENTAL QUALITY ACCOUNT (Continued)
Boulder River Watershed, Montana

Components

Beneficial and adverse effects:

C. Biological resources and
selected ecological systems

Measures of Effects

1. The creation of 800 acres of border vegetation on benchlands for game and nongame wildlife cover.
2. Inundation of 3.6 miles of stream fishery and streambank vegetation on the Little Boulder River.
3. Blockage of fish movement on the Little Boulder River.
4. Loss of brushy vegetation along the abandoned canals.
5. The maintenance of 3,000 acres of riparian habitat in the bottomlands adjacent to the Boulder River.
6. Establishment of brushy vegetation on 36 miles of new canals that are constructed on the benchlands.
7. An improvement in fish populations resulting in an increase of 800 fisherman days on 30 miles of the Boulder River.
8. Availability of a water supply for wildlife that inhabit the benchlands during the irrigation season.
9. Improvement of the fishery and streambank vegetation along reaches of Boulder River that are presently dewatered each summer.
10. Improvement of fish habitat by reduced use of 25 diversions that now restrict fish movement and cause disturbance of the channel bottom.
11. Some disturbance of wildlife on the benchlands when 36 miles of irrigation canals are constructed and rehabilitated.

SELECTED ALTERNATIVE
ENVIRONMENTAL QUALITY ACCOUNT (Continued)
Boulder River Watershed, Montana

Components

Beneficial and adverse effects:

Measures of Effects

- | | |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| D. Historical, archeological, and geological | 1. Construction of the reservoir will destroy the site of the Boulder stage station. |
| E. Irreversible or irretrievable commitment | 1. 380 acres of land for the dam and reservoir.

2. 220 acres of land for irrigation canals and access roads. |

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT
Boulder River Watershed, Montana

<u>Components</u>		<u>Measures of Effects</u> ^{1/}		<u>Components</u>		<u>Measures of Effects</u> ^{1/}	
Income:		State of Montana	Rest of Nation	Income:		State of Montana	Rest of Nation
Beneficial effects:		--- Dollars ---		Adverse effects:		--- Dollars ---	
A. The value of increased output of goods and services to users residing in the region.	1. Agricultural water management	466,900	---	A. The value of resources contributed from within the region to achieve the outputs.	1. Multipurpose reservoir	170,250	177,850
	2. Recreation	108,100	---		2. Canals and appurtenances	1,600	55,600
					3. Recreation facilities	44,500	-0-
B. The value of output to users residing in the region from external economies.	1. Induced by and stemming from effects	99,180	---		Project Installation	170,250	177,850
					Project Administration	1,600	55,600
					OM&R	44,500	-0-
Total beneficial effects		674,180	---	Total adverse effects		216,350	233,450
				Net beneficial effects		457,830	-233,450

1/ Average annual

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March 1976

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT (Continued)
Boulder River Watershed, Montana

<u>Components</u>	<u>Measures of Effects</u>		<u>Components</u>	<u>Measures of Effects</u>	
	<u>State of Montana</u>	<u>Rest of Nation</u>		<u>State of Montana</u>	<u>Rest of Nation</u>
Beneficial effects:					
A. Increase in number and types of jobs			A. Decrease in number and types of jobs		
1. Agricultural employment	5.6 permanent agricultural jobs	---	1. Loss in agricultural employment of project take area	0.5 permanent agricultural job	---
2. Employment for project construction	85 skilled jobs & 14 semiskilled jobs for 1 year	---	Total adverse effects	0.5 permanent agricultural job	---
3. Employment for project OM&R	3 permanent semi-skilled jobs	---	Net beneficial effects	5.1 permanent agricultural jobs	---
4. Employment in service and trade activities induced by and stemming from project operation	3.3 permanent semi-skilled jobs	---		85 skilled & 14 semiskilled jobs for 1 year	---
Total beneficial effects	5.6 permanent agricultural jobs	---		6.3 permanent semiskilled jobs	---
	85 skilled and 14 semiskilled jobs for 1 year	---			
	6.3 permanent semi-skilled jobs	---			

SELECTED ALTERNATIVE
REGIONAL DEVELOPMENT ACCOUNT (Continued)
Boulder River Watershed, Montana

<u>Components</u>	<u>Measure of Effects</u>	
	<u>State of Montana</u>	<u>Rest of Nation</u>
Regional economic base and stability	Provides full season irrigation water supply for 10,700 acres in an area where agriculture is the economic mainstay. Creates 11.9 permanent semi-skilled jobs, 85 short-term skilled jobs, and 14 short-term semi-skilled jobs in an area where 9 percent of the families have incomes less than the national poverty level.	
Beneficial effects:		
Adverse effects:		

Component

Measures of Effects

Beneficial and adverse effects:

A. Real income distribution

- 1. Create 76 man-years of skilled employment, 13 man-years of unskilled employment over a 5-year period.
- 2. Create 89.7 man-years of unskilled employment per year over the life of the project.
- 3. Create regional income distribution of \$575,000 of primary benefits by income class as follows:

Income Class	Percentage of	
	Adjusted Gross Income in Class	Percentage Benefits in Class
Less than 3,000	9.2	8
3,000-10,000	56.4	57
More than 10,000	34.4	35

- 4. Local cost to be borne by region totals with distribution by income class as follows:

Income Class	Percentage of	
	Adjusted Gross Income in Class	Percentage of Contributors in Class
Less than 3,000	9.2	8
3,000-10,000	56.4	57
More than 10,000	34.4	35

March 1976

SELECTED ALTERNATIVE
SOCIAL WELL-BEING ACCOUNT (Continued)
Boulder River Watershed, Montana

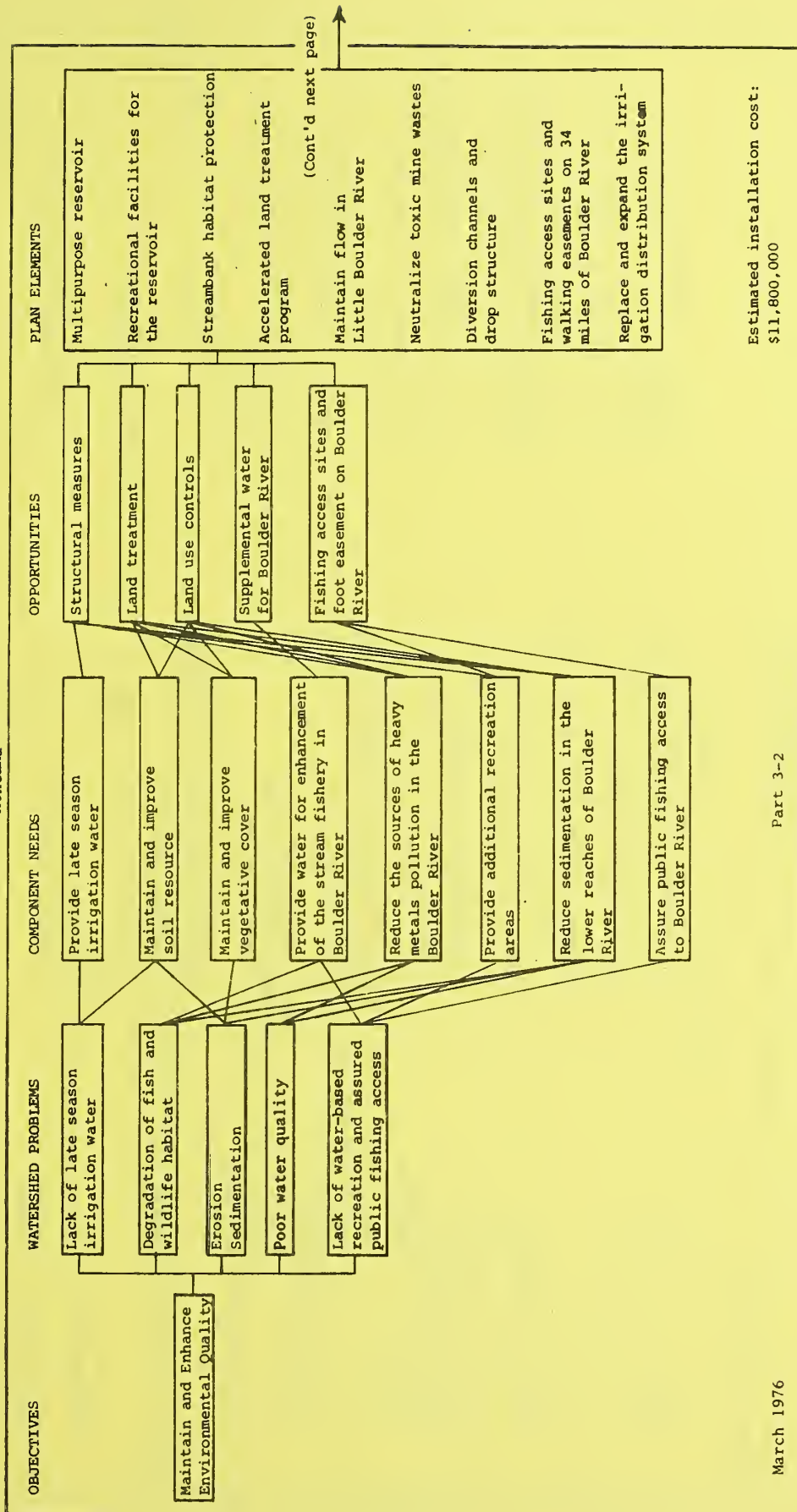
<u>Component</u>	<u>Measures of Effects</u>
Beneficial and adverse effects:	
B. Life, health, and safety	<ol style="list-style-type: none"> 1. Mosquito breeding areas will be decreased on the lowlands along the Boulder River.
C. Education, cultural, and recreational opportunities	<ol style="list-style-type: none"> 1. Creates 35,130 recreational visitor-day activities at the reservoir site. 2. Creates 7,560 fisherman-day activities at the reservoir site and 800 live stream fisherman-days on the Boulder River. 3. Creates a loss of 780 live stream fisherman-days on the Little Boulder River.

ABBREVIATED ENVIRONMENTAL QUALITY ALTERNATIVE

The abbreviated environmental quality plan has been developed by an interdisciplinary team using information and data assembled during investigations and analysis for the watershed work plan. The procedure used in developing the alternative and its content are included on a flow chart. This procedure begins with recognition of the watershed problems and needs. Desired environmental effects or component needs are translated from the problems and needs and provide a base for examining appropriate water and land resource use and management opportunities. Opportunities that emphasize contributions to the component needs were selected and are shown as plan elements of the alternative. The interrelationship of each step in this procedure is illustrated on the flow chart. The cost of \$11,800,000 for its installation is a preliminary estimate. The expected environmental effects of the alternative are shown.

Implementation of features of this alternative would require acceptance by the local people. Adequate legislative authorities exist for implementation; however, funding is presently not available.

ENVIRONMENTAL QUALITY ALTERNATIVE
Boulder River Watershed
Montana



ENVIRONMENTAL QUALITY ALTERNATIVE (Continued)

Boulder River Watershed
Montana

AREAS OF NATURAL BEAUTY

1. Eliminate two solid waste dumps near the reservoir basin.
2. 350 acres of flat water will be created.
3. Structural measures will affect visual quality of the valley landscape.
4. Scenic value around the reservoir will be reduced late in the irrigation season when reservoir draw-down will expose nonvegetated shorelines.
5. 210 acres of rangeland and 160 acres of cropland will be required for irrigation canal construction.
6. Brushy habitat will become established along the canals.

QUALITY CONSIDERATIONS OF
WATER, AIR, AND LAND RESOURCES

1. Land treatment will reduce sedimentation.
2. Air and water pollution will be increased during project construction.

3. Water quality in Boulder River will improve by reducing mine drainage.
4. Protection of streambank vegetation will reduce streambank erosion.
5. Streamflow augmentation in Boulder River will improve water quality.
6. Fragile landscape areas may be damaged by recreational and fisherman use.
7. Tranquillity will be affected by recreation visitors at reservoir and stream sites.
8. 5,000 acres will receive a full water supply, providing increased net incomes to ranchers.

BIOLOGICAL RESOURCES AND
SELECTED ECOLOGICAL SYSTEMS

1. Trout populations will be increased along 34 miles of Boulder River (from 10 pounds per surface acre to 50 pounds per surface acre).
2. Land treatment will enhance cover and habitat.
3. Fish and wildlife habitat will be provided on the 350-acre reservoir.

4. 300 acres of riparian habitat will be improved by restricting livestock movement.
5. Border vegetation on benchlands will be created for wildlife cover.
6. Reservoir and dam will require 380 acres of land, including 60.6 acres of riparian vegetation which receives incidental winter use by elk and mule deer.
7. 3.6 miles of stream fishery and associated riparian vegetation will be inundated.
8. Fish movement on the Little Boulder River will be blocked.
9. About 11.0 acres of forested land will be committed for road construction.
10. Pheasant and grouse populations will increase due to increased small grain production.
11. A base flow of 50 cfs will be maintained in Boulder River.

(Cont'd next page)

GEOLOGICAL, ARCHEOLOGICAL, AND
HISTORICAL RESOURCES

1. Evidence of the Boulder stage station will be preserved for public appreciation.
2. Boulder stage station site will be destroyed March 1976

Part 3-3

ENVIRONMENTAL QUALITY ALTERNATIVE (Continued)

Boulder River Watershed
Montana

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS

1. Installation of the dam and reservoir will commit 47.3 acres of pastureland and hayland; 60.6 acres of riparian vegetation; 174.2 acres of rangeland; and 97.9 acres of hydraulically-mined land.
Total--380 acres.
2. Installation of canals and appurtenances will commit 210 acres of rangeland and 160 acres of cropland.
3. Installation of stream diversions near mines and tailings will commit 10 acres of disturbed land.

March 1976

Part 3-4

ENVIRONMENTAL IMPACT STATEMENT

BOULDER RIVER WATERSHED

Jefferson County, Montana

March 1976

USDA-SCS-EIS-WS- (ADM)-76-1-F-MT

Boulder River Watershed Project, Jefferson County, Montana

ENVIRONMENTAL IMPACT STATEMENT

Van K Haderlie, State Conservationist
Soil Conservation Service

Sponsoring Local Organizations

North Boulder Drainage District, Boulder, Montana 59632

Jefferson Valley Conservation District, P. O. Box D, Whitehall, Montana 59759

March 1976

PREPARED BY
UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
P. O. Box 970
Bozeman, Montana 59715

USDA ENVIRONMENTAL IMPACT STATEMENT

Boulder River Watershed Project
Jefferson County, Montana

Prepared in Accordance With
Sec. 102(2)(C) of P.L. 91-190

- I Final Summary
- II Soil Conservation Service
- III Administrative
- IV Description of Action: A project for watershed protection, irrigation, and recreation in Jefferson County, Montana, to be implemented under the authority of the Watershed Protection and Flood Prevention Act (PL-566, 83d Congress, 68 Stat. 666), as amended.
- V Summary of Environmental Impacts Including Favorable and Adverse Environmental Effects: Project action will:
- (1) provide a reliable irrigation water supply for 10,700 acres of cropland.
 - (2) shift 2,800 acres of Class IV, V, and VI hayland to pastureland.
 - (3) shift 5,700 acres of Class II and III dry cropland and 500 acres of rangeland to irrigated land.
 - (4) result in more efficient use of irrigation water.
 - (5) create a permanent 165-acre recreational pool.
 - (6) increase fisherman use in the Boulder River by 800 days on 30 miles of stream.
 - (7) cause the loss of 780 fisherman days use annually on 5.2 miles of the Little Boulder River.
 - (8) increase crop yield and livestock production in the watershed.
 - (9) increase employment opportunities by 1289 man-years during project life.
 - (10) commit 380 acres of land to the dam and reservoir, of which 350 acres will be for public recreational use when the reservoir is full.
 - (11) use 370 acres of land for irrigation canals and right-of-way.
 - (12) provide about 35,130 general recreation visitor days and 7560 fisherman days on the reservoir annually.
 - (13) commit about 19.0 acres of forested land for road and powerline relocation.
 - (14) cause the relocation of three families (10 persons).
 - (15) increase air, water, and noise pollution during construction.
 - (16) increase water in the Boulder River fishery during low flows.
- VI List of Alternatives Considered: (1) no project; (2) accelerated land treatment alone; (3) single purpose irrigation reservoir with land treatment; (4) multipurpose reservoir for irrigation and recreation with land treatment; and (5) multipurpose reservoir for irrigation, recreation, and fish and wildlife with land treatment.
- VII Agencies and Individuals From Which Comments Have Been Received: Governor of Montana; Department of the Army; Environmental Protection Agency; Department of Health, Education and Welfare; Montana Department of Fish and Game; Ron Holliday, Montana State Historic Preservation Officer; Montana Bureau of Mines and Geology; Montana Department of Health and Environmental Sciences; Department of Housing and Urban Development; Robert P. Ryan; Bruce Gilmer; Barbara Shink; Advisory Council on Historic Preservation; and Department of the Interior.
- VIII Draft Statement Transmitted to CEQ on January 9, 1976.

USDA SOIL CONSERVATION SERVICE
FINAL ENVIRONMENTAL IMPACT STATEMENT^{1/}

for

Boulder River Watershed, Montana

AUTHORITY

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566 83rd Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

North Boulder Drainage District
Jefferson Valley Conservation District

PROJECT PURPOSES AND GOALS

The objectives of this project are to:

- (1) provide watershed protection for 223,600 acres in the Boulder River Watershed through land treatment and structural measures;
- (2) rehabilitate the present irrigation distribution system, alleviate water shortages, and increase irrigation efficiencies, thereby:
 - a. eliminating irrigation water shortages on 4,500 acres;
 - b. allowing ranchers to shift irrigation from 2,800 acres of Class IV, V, and VI land to Class II and III land;
 - c. expanding the total irrigated area in the watershed from 7,300 acres to 10,700 acres.
- (3) provide permanent water storage of 2,700 acre-feet for recreation and a developed recreational area of 285.5 acres; and
- (4) provide water for stream fishery enhancement on about 30 miles of the Boulder River.

^{1/} Technical assistance for the preparation of this environmental impact statement was provided by Ecology and Environment, Inc., Billings, Montana. All information and data, except as otherwise noted, were collected by Soil Conservation Service and Forest Service, USDA.

Meeting these objectives will stabilize ranching operations in the valley, improve fish and wildlife habitat, provide widespread public recreation benefits, and protect soil and water resources in the watershed.

PLANNED PROJECT

The Boulder River Watershed, containing about 350 square miles, encompasses the central portion of the Boulder River basin (total drainage area of 762 square miles). The principal tributaries to the Boulder River in the watershed are the Little Boulder River and Elkhorn Creek.

The Boulder River Watershed excludes about 380 square miles of the Boulder River basin above the city of Boulder. Also excluded from the watershed is the lower portion of the basin containing 32 square miles. The watershed area has been defined to contain the major resource problem area although conditions throughout the basin have been considered.

The planned action involves a multipurpose reservoir with associated recreational facilities on the Little Boulder River, an irrigation distribution system, and watershed land treatment.

Land Treatment

Conservation land treatment is formulated on the basis of using each acre within its capability and planning measures in accordance with need. There will be about 163,920 acres of land in the watershed adequately treated.^{2/}

The Boulder River Watershed is within the Jefferson Valley Conservation District. Technical assistance is provided on private nonforested land by the Soil Conservation Service (the Service) and on private forested land by the Montana State Forester in cooperation with the U. S. Forest Service. National Forest land in the watershed is managed according to existing policies of the U. S. Forest Service and the multiple use plan of the Deer Lodge National Forest (17). National Resource lands in the watershed are managed according to existing policies of the Bureau of Land Management and the cooperative agreement with the Jefferson Valley Conservation District (18).

^{2/} SCS defines land adequately treated as land used within its capability on which the conservation practices that are essential to its protection and planned improvement have been applied.

Conservation land treatment on private land in the watershed will be carried out as a voluntary action by cooperators of the Jefferson Valley Conservation District. Conservation plans, prepared by the landowners with technical assistance provided by the Service, will outline those conservation practices that are considered necessary to the success of the project.

Land treatment measures planned by the landowners for cropland include water control structures, grassed waterways, drainage mains, drainage field ditches, irrigation field ditches, irrigation land leveling, surface irrigation systems, sprinkler irrigation systems, irrigation water management, land smoothing, pasture and hayland planting, pasture and hayland management, conservation cropping systems, and irrigation pipelines. Planned drainage measures will return surface water to the Boulder River. During the installation period, about 9,060 acres of cropland will be adequately treated or protected.

Conservation land treatment planned for rangeland includes proper grazing use, planned grazing systems, spring developments, wells, ponds, pipelines, tanks, lined pits, brush management, weed control, fencing, and range seeding. It is estimated that 80,460 acres of rangeland will be adequately treated or protected by the end of the installation period.

Conservation land treatment planned for private forested lands includes forest management plans, fire protection, silvicultural control of disease and insects, and commercial thinning on high-producing sites.

Land treatment practices on federal lands will be installed in cooperation with the Service, the Jefferson Valley Conservation District, and the North Boulder Drainage District. A multiple use plan has been developed by the U. S. Forest Service on national forest lands (17). Land treatment measures planned by the Forest Service include fire protection, silvicultural control of disease and insects, commercial thinning on high-producing sites, harvest cutting based on habitat types, selection of harvest methods to meet requirements for regeneration of the climax tree species with modifications made to protect wildlife, closure of all temporary roads used during logging, and reseedling to prevent soil erosion. Land treatment on National Resource lands, leased to private landowners, will be installed to meet program criteria of the Bureau of Land Management (18). Land treatment measures on these lands will be similar to those on private rangeland.

The Montana Department of State Lands (19) and the Montana Department of Institutions (20) will help private operators install land treatment measures in cooperation with the Jefferson Valley Conservation District. Land treatment measures on State of Montana lands will be similar to those measures on private lands.

Structural Measures

A multipurpose reservoir will be installed on the Little Boulder River. Reservoir storage will be provided for: (1) irrigation water, (2) recreational water, (3) fish and wildlife water, and (4) sediment. The dam will be a zoned earth fill 99 feet high controlling a drainage area of 58.0 square miles. The dam will have a clay core covered with a gravel and cobble shell protected by riprap on the upstream slope. The structure will be founded on alluvial deposits. Stripping will remove alluvial material 20 feet deep under the base of the dam. A cutoff trench will extend through another 20 feet of alluvial material to thermally altered granite.

The spillway system will consist of an excavated rock emergency spillway with a reinforced concrete side channel principal spillway across the emergency spillway to reduce damage from low flows. See Figure 3, Profile of Spillways, Appendix B. The channel outlets into a reinforced concrete pipe to a reinforced concrete chute. An energy dissipating basin will be located at the outlet of the chute spillway. The principal spillway will carry all discharges below 750 cubic feet per second (cfs), approximately one and one-half times the peak flow generated by a 100-year (1.0 percent chance) frequency storm event. Permanent reservoir storage includes 300 acre-feet for sediment and 2,700 acre-feet for recreational use. There will be 9,900 acre-feet of irrigation water storage and 2,100 acre-feet of dual-use water for irrigation and fish and wildlife. Total reservoir capacity at the crest of the spillway system will be 15,000 acre-feet.

The surface area of the irrigation pool at the crest of the spillway system is 350 acres. The surface area of the permanent recreation pool is 165 acres. The surface area of the sediment pool is 50 acres. The average pool area during the summer (May through August) will be 278 acres.

The reservoir will have a maximum depth of 89 feet. The depth of the permanent recreation pool will be 40 feet. The average summer pool will be about 70.5 feet deep. Irrigation releases will result in an average annual drawdown of 36.3 feet and a maximum (20 percent chance) drawdown of 49 feet.

The dam, reservoir, and recreation area will require 823.75 acres of land. This will include acquisition of 541.25 acres private land, 202.5 acres federal land, and 80.0 acres State land.

Land rights acquisitions for the project will involve a number of actions to be taken by the U. S. Department of the Interior, Bureau of Land Management, which will include the following:

1. Right-of-way for 44.4 acres of BLM land in the reservoir basin. This right-of-way is to be acquired under provisions of 1891 law.
2. Right-of-way for 85.6 acres of BLM land in the designated recreational area surrounding the reservoir. This right-of-way is to be acquired under provisions of the 1965 Recreation and Public Purposes Act (R&PP Lease).
3. A withdrawal from mineral entry is outstanding for the BLM land to be used for dam and reservoir. This withdrawal was filed by the Department of Transportation in connection with alternative routes considered for the location of Interstate Highway I-15. A clearance of this withdrawal will be required. The selected route for I-15 will not affect lands in this area.
4. A mining claim has been filed in the upper reservoir area on BLM land. A clearance for this land right must be obtained.
5. The Boulder River School and Hospital operates a day camp on BLM land by means of a Recreation and Public Purposes Act lease. This lease must be relinquished. A new R&PP lease will be required for the day camp as relocated by the project. This lease will be developed between the Boulder River School and Hospital and the Bureau of Land Management.
6. The relocation of the 69 KV powerline will be partly on BLM land. A transmission line right-of-way issuance for relocation will be requested along with the relinquishment of the present right-of-way.
7. BLM lands within the project area are within a designated "known geothermal resource area" (KGRA). This designation will require a clearance from the U. S. Geological Survey.
8. Minor portions of the canal delivery system in the lower watershed will be located on BLM land. A right-of-way for canals will be required.
9. Road relocation around the reservoir will involve a portion of BLM land. A permit to relocate this road will be required.
10. The use of BLM lands for project purposes will require an evaluation and possible minor adjustments of grazing privileges.

Land rights acquisitions for the project will include the following actions to be taken by the U. S. Department of Agriculture, Forest Service:

1. A special use permit for 13.1 acres of national forest land in the reservoir basin.

2. A special use permit for 59.4 acres of national forest lands in the designated recreational area.
3. The relocation of the 69 KV powerline will be partly on national forest land. An amendment of the existing special use permit for relocation of the powerline will be requested along with relinquishment of the present right-of-way.
4. Road relocation around the reservoir will involve a portion of national forest land. A special use permit for construction of this road will be required.

Borrow materials will come from the reservoir basin, the emergency spillway excavation, and along the northwest side of the reservoir. Gravel and cobble materials for the outer shell of the dam will be obtained from old hydraulic mine spoils in the reservoir basin. Sufficient quantities of clay materials are available within a 40-acre area above the mine spoils. Land rights agreements may result in obtaining a portion of the clay borrow from a 20-acre area outside, but adjacent to, the acquisition line.

Installation of land rights for the reservoir will result in the displacement of three families, one of which has a farm business operation. A total of 10 persons will be displaced.

About 2.3 miles of existing road along the Little Boulder River at the mouth of the canyon will be inundated by the reservoir. A new access road will be constructed following approximately the same alignment as the existing road. The new road will be cut into the hillside above the high water line for the reservoir. Rock excavated for the road relocation will be used as riprap on the dam. See Figure 8, Project Area Map, Appendix B.

There will be 1.1 miles of road constructed to relocate the Whitetail road that is in the construction area. This road will be constructed across the top of the dam.

Refuse in two solid waste dump areas on the north side of the reservoir will be moved to an approved location and the areas will be backfilled as a part of reservoir clearing. A county-wide garbage district has been organized and an approved land fill facility has been provided.

Existing irrigation diversions and delivery systems will be combined and reorganized. Water will be diverted from the Boulder River at two diversions and approximately 12 individual pumping stations, eliminating the need for the existing 25 diversions. The major diversion will be located in the NE $\frac{1}{4}$ of Section 14, Township 5N, Range 4W, Montana Principle Meridian (MPM). A reinforced concrete diversion structure and two reinforced concrete measuring flumes will be con-

structed at this location to divert water into the East Side Canal and the West Side Canal. See Figure 8, Project Area Map, Appendix B. The structure will be designed to allow passage of fish and other aquatic life and maintenance of stream flows. See Figure 4, Irrigation Diversion Structure, Appendix B. The smaller diversion will be located in the SW $\frac{1}{4}$ of Section 18, Township 4N, Range 2W, MPM. This diversion will utilize an existing irrigation diversion structure to divert water into the Lower East Side Canal. A metal measuring flume will be installed.

A canal approximately 1.1 miles long to deliver reservoir irrigation releases will be constructed from the dam on the Little Boulder to the Boulder River. This canal will be constructed through thermally altered granite, hard granite, clays weathered from granite, and alluvium. The canal will be clay-lined through unstable materials. Seepage losses will be nearly zero. During the irrigation season the Little Boulder River will carry up to 10 cfs of irrigation water from the dam to the Boulder River. The water will be transmitted from the irrigation outlet to the Little Boulder River in an 18-inch-diameter pipe and impact basin. The Little Boulder joins the Boulder River above the canal diversion points.

A total of 35.0 miles of delivery system canals will be constructed along the Boulder valley, downstream from the major diversion site. This includes 19.0 miles of canal along the east side of the valley and 16.0 miles of canal along the west side of the valley. Most canal construction will be through alluvial materials with a permeability range of 6 to 12 inches per day. This represents a seepage loss of 1.5 to 2.5 percent per mile. The distribution system will require 370 acres of canal right-of-way. Of this, 220 acres will be committed to canals and access roads. About 200 acres of land committed to existing distribution canals will be recovered.

There will be 371.5 acres of land area available for public recreational use, along with the 350-acre water surface when the reservoir is full. Recreational facilities will be installed near the reservoir. See Figure 7, Recreation Proposal, Appendix B. A nature trail will be constructed around the south side of the reservoir. Access to the recreation area on the north side of the reservoir will be from the relocated Little Boulder road. The Boulder River School and Hospital day camp, which is now located in the proposed reservoir basin, will be relocated on National Resource land adjacent to the developed recreational area. See figure 7, Appendix B, EIS. Access will be provided from roads developed to serve the recreational area.

Recreation in and around the reservoir will be designed for day use. One hundred twenty-four vehicle parking spaces with barriers will be provided. Thirty-two picnic tables and nine grills will be installed. Approximately 2.7 miles of foot trail will be constructed around the south side of the reservoir. See figure 7. The entire recreational

area will be enclosed by eight miles of wire fence. About 0.9 mile of road will be constructed within the recreational area. Roads within the recreational area will be constructed from locally available material and graveled. Drinking water at the recreational area will come from a well. Sanitation facilities will be four double vault latrines. A graded gravel ramp will be located on the north side of the reservoir for boat access. The recreational area will be developed in a natural setting with disturbed areas revegetated with adapted grass and trees. Designs for facilities will include provisions for the physically handicapped.

An old stage station site (evidence of old foundation and walkway) will be destroyed during excavation for the foundation of the proposed dam on the Little Boulder River. The significance of this site has been assessed by the Montana Statewide Archeological Survey.

The State Historic Preservation Officer has been notified in writing of the historical and archeological setting of this project. He declined to render an opinion on eligibility of the cultural resources found at the old stage site for inclusion in the National Register of Historic Places.

A request was submitted to the Secretary of the Interior through his designated representative, the Office of Archeology and Historic Preservation, National Park Service, Washington, D. C. Further archeological testing of this site has been recommended. Following testing, the Secretary of the Interior will be requested to undertake the recovery of these resources which would be affected by the proposed project if, in his opinion, such actions are necessary. Any recovery operations will be performed in accordance with Public Law 93-291.

Construction contracts will make provisions for actions to be taken should significant historical or archeological values be encountered. Provisions will include instruction to all construction personnel to report such findings and to promptly avoid unnecessary destruction of artifacts and features. Provisions will also include the suspension of operations which would damage the findings until the National Park Service Office of Archeology has been notified and a decision on needed action obtained. Such action will follow the procedures in PL-93-291. Also, since this is a federally assisted local project, there will be no change in the existing responsibilities of any federal agency under Executive Order 11593 with respect to archeological and historic resources.

Construction contracts will include measures to minimize soil erosion and water, air, and noise pollution. Contracts will also contain appropriate landscape management practices designed to reduce the impact of structural measures on the visual resource. Disturbed areas subject to erosion will be vegetated and mulched. Water pollution will

be minimized by measures such as sediment basins to treat project water or water muddied by construction, temporary bridges and culverts where construction roads cross the stream, diversion of water, storage tanks for disposal of waste lubricants and chemicals, and sanitary facilities. Local and state laws pertaining to burning will be adhered to so as to minimize air pollution. Dust on the construction site and access roads will be suppressed by sprinkling. Noise from construction will affect only those involved in construction because of the remoteness of the site. Measures will be taken to safeguard the workmen from excessive construction noise.

Operation and Maintenance

Land treatment measures on private land will be operated and maintained by individual landowners and operators with technical assistance provided by the Service and the Montana Division of Forestry. Land treatment on state and federally owned lands will be operated and maintained by the appropriate state or federal agency.

The dam, irrigation delivery system, and recreational facilities will be operated and maintained by the North Boulder Drainage District in compliance with agreements satisfactory to the sponsors and the Service. An operation and maintenance agreement will be executed for each structural measure prior to signing of a land rights, relocation, or project agreement in accordance with the SCS State of Montana Watersheds Operation and Maintenance Handbook and will include specific provisions for retention and disposal of real and personal property acquired in whole or in part with PL-566 funds which will be handled in accordance with the Federal Management Record 74-7. The operation and maintenance of all facilities are to meet the requirements of the State and local public health agencies.

A period of time is prescribed to provide for the establishment of adequate vegetative cover for measures. This "establishment period" applies only to vegetation associated with structural measures. The establishment period terminates when the Service notifies the sponsors that adequate vegetative cover is established or after two growing seasons have elapsed after the initial installation of vegetative measure. During the establishment period for vegetative measures, the Service may approve PL-566 cost-sharing for additional work required to obtain an adequate vegetative cover.

A Service employee, responsible for operation and maintenance inspections and followup, and the local sponsors will make a joint inspection annually, after severe storms, and after the occurrence of any other unusual conditions that might adversely affect the structural measures. These inspections will continue annually for three years following the acceptance of the works of improvement for operation and maintenance by the local sponsors. Inspections after the third year will be made annually by the local sponsors and a written report of conditions and recommended actions will be submitted to the Service employee responsible for seeing that operation and maintenance are

carried out. In situations where the sponsors have shown a lack of ability to carry out inspections properly, or there is an indication of need for continued Service assistance, the Service may continue to provide assistance after the third year at the discretion of the State Conservationist.

The Service employee responsible for operation and maintenance inspections and followup will thoroughly review the sponsors' inspection, operation, and maintenance reports. Evidence that inspections or needed maintenance are not being performed properly and promptly will be reported to the State Conservationist, who must then take appropriate action on reported deficiencies.

The operation of structural measures shall include, but not be limited to:

1. Operating the multipurpose reservoir on the Little Boulder River for irrigation water management and recreational use. Stored waters will not be withdrawn below the elevation of the permanent recreational pool except as necessary for repairs and maintenance or operation for recreation or fishery management at the mutual consent of the sponsors and the Soil Conservation Service. The sponsors, with the assistance of the Montana Department of Fish and Game, will develop a recreation management plan to make boating and fishing compatible.
2. Operation of the recreational facilities will be for the use of the general public. If the facilities are operated on a fee basis, the schedule of fees shall be designated to write off capital investment, operation, maintenance, and replacement costs only, and not as a profit-making venture. Operation of these facilities will include necessary custodial, sanitation, safety, and policing services.
3. Operating the irrigation delivery system, project irrigation pump unit, and pipelines to insure proper distribution and management of irrigation water. The operation of the main irrigation diversion structure on the Boulder River will provide for bypassing a minimum flow of 12 cfs during the irrigation season. During short water years and times when the reservoir does not completely fill, this minimum flow will be adjusted proportionate to the available reservoir storage. Irrigation operations will be conducted such that the Boulder River will not be completely dewatered. Measuring devices will be provided at strategic points to insure proper use of released waters.
4. Operating streamflow measuring and recording stations on the Boulder and Little Boulder Rivers.
5. Operation of the irrigation outlet works at the reservoir will provide for releases of up to 10 cfs in the Little Boulder River during the irrigation season.

The maintenance of structural measures shall include, but not be limited to:

1. Replacement and repair of water control gates and appurtenant irrigation structures as needed, including project pumping plant, pipelines, and canals.
2. Removing trash that collects in the diversion, division boxes, measuring devices, or inverted siphon inlets and outlets.
3. Replacement and repair of tables, grills, latrines, signs, or other appurtenant structures associated with the recreational area.
4. Repair or rebuilding of recreational roads as required.
5. Maintaining or replacing protective vegetative cover, riprap, and fences as needed.
6. Periodic or annual restocking of trout in the multipurpose reservoir by the Montana Department of Fish and Game as deemed desirable by the Department through agreement with the sponsors. It will be the Department's responsibility to control or eradicate rough fish.

See table 4, Watershed Work Plan, for estimated operation, maintenance, and replacement costs.

Project Costs

Structural measures costs, project administration costs, and total project installation costs are distributed between PL-566 (Public Law 83-566, Watershed Protection and Flood Prevention Act) and other funds as follows:

	<u>PL-566</u>	<u>Other</u>	<u>Total</u>
Structural Measures	3,043,820	2,902,980	5,946,800
Project Administration	954,700	27,600	982,300
Land Treatment	60,890	2,566,850	2,627,740
Total Project Installation Cost	4,059,410	5,497,430	9,556,840

ENVIRONMENTAL SETTING

Physical Resources

The Boulder River Watershed is located in the central part of Jefferson County, Montana. It lies just east of the Continental Divide in southwestern Montana and is surrounded by prominent ranges of the Rocky Mountains. The river originates near the Continental Divide and flows generally in a southeasterly direction to its confluence with the Jefferson River about eight miles east of Whitehall. The Boulder River flows in a steep, narrow canyon until it reaches the city of Boulder where it enters the broad Boulder valley. See Figure 9, Project Map, Appendix B, and Plate 10, Watershed Work Plan.

The Boulder River Watershed encompasses most of the lower portion of the Boulder River basin. The watershed project boundary begins about 25 miles downstream from the headwaters of the Boulder River at a point about one mile west of the city of Boulder. The watershed includes all the drainage of the Little Boulder River, Elkhorn Creek, and lands downstream from these tributaries drained by the Boulder River. The southern watershed boundary is about six miles above the mouth of the Boulder River where large springs supplement the river flow. The watershed contains approximately 29 miles of the Boulder River flood plain.

The watershed encompasses an area of 223,600 acres, approximately 350 square miles. It is located in Water Resources Region 10 (Missouri) Subregion 02 (Missouri Headwaters), Land Resources Areas 43 (Northern Rocky Mountains) and 44 (Northern Rocky Mountain Valleys), and OBE Economic Area 094. The watershed and Jefferson County are typical of the northwestern portion of the Missouri Water Resource Region, particularly in regard to low population densities, decreasing rural populations, and an agricultural economic base.

The city of Boulder is located at the northern edge of the watershed. Boulder (population 1342) is the county seat of Jefferson County (population 5238) and is the principal population, social, and business center in the watershed (7). Boulder is located along the major highway route between Butte and Helena. It is 37 miles northeast of Butte and 28 miles south of Helena. Elkhorn is the only other community in the watershed. This old mining town is located high in the Elkhorn Mountains in the northeast corner of the watershed. Elkhorn was a thriving community of over 1000 persons around the turn of the century, but only a few families live there now.

Approximately 64 percent of the watershed area is steep mountainous terrain. Most of the mountain areas in the watershed are forested. These areas are used for grazing, limited timber harvest, and recreational activities. The mountain flanks and foothills are primarily

rangeland with scattered wooded areas. Forest lands account for 74,400 acres (33.3 percent) of the watershed; and rangeland accounts for 134,100 acres (60.0 percent).

The Boulder River valley, used primarily for agricultural cropland, accounts for most of the remaining land in the watershed. Elevations range from 4,480 feet, where the Boulder River leaves the watershed, to 9,414 feet at the summit of Crow Peak in the Elkhorn Mountains. Within the watershed the Boulder River drops approximately 20 feet per mile.

The topography of the watershed is closely controlled by the structure and lithology of the bedrock. The major part of the watershed is underlain by granitic rocks, which have intruded ancient sedimentary rocks and andesitic volcanic rocks.

The igneous rocks have been carved into broad summits and smooth-surfaced mountain valleys of the Bull Mountains and the Boulder Mountains that form the western and northwestern margins of the watershed.

The Elkhorn Mountains form the northeastern and eastern margins of the watershed. They are carved in a thick sequence of sedimentary and layered volcanic rocks that have been intensively folded and faulted and cut by intrusive igneous rocks. Erosion of the alternating layers of more resistant and less resistant rocks form rugged mountains with high jagged peaks. The higher parts of the mountains have been sharpened by Pleistocene glaciation.

The intermontane valley of the Boulder River occupies the central portion of the watershed. This broad valley is separated from the mountains by large-scale block faulting which has uplifted the mountain blocks east and west of the valley basin. Most of the valley has been filled by unconsolidated alluvial and lakebed materials. The wide sloping benches above the Boulder River flood plain are composed of these deposits. Downcutting of the Boulder River in the lower watershed has dissected the valley fill deposits, leaving two high terraces. Coarse fan deposits and fine gravel pediment veneers occupy the broad valley at the mouth of Elkhorn Creek and Dry Creek. The bench that is formed is wider and flatter than the benches on the west side of the river. These benchlands are primarily used for cropland and rangeland.

The Boulder River flood plain averages one-half mile in width. The flood plain area has low topographic relief and has incised the valley fill deposits. In general, low terraces separate the flood plain from the adjacent benchlands. Most of the flood plain lowlands are composed of subirrigated cropland, backwater channels, swampy areas, and riparian vegetation.

The major tributaries to the Boulder River head in the mountains on northern and northwestern parts of the watershed. The principal tributaries are the Little Boulder River and Elkhorn Creek. The Little Boulder River Watershed has a drainage area of 58.8 square miles. It occupies the northwestern portion of the watershed and flows eastward to the Boulder River at a point about three miles downstream from the city of Boulder. The Elkhorn Creek Watershed has a drainage area of 39.2 square miles. It occupies the northeastern portion of the watershed and flows southward to the Boulder River at a point about nine miles downstream from the city of Boulder.

Little Boulder River flows in a deeply incised, narrow canyon through most of its course. It opens into the Boulder valley about two miles upstream from its confluence with the Boulder River. The upper 94 percent of the Little Boulder Watershed is in the Deer Lodge National Forest. Most of this area is densely forested and is virtually undisturbed. The lower Little Boulder Watershed is mostly benchland which is used for range. A small part of the lower watershed (218 acres) consists of lowlands of the Little Boulder flood plain which are presently used for pasture and hayland. In the past, part of the lower Little Boulder Watershed (98 acres) was involved in a hydraulic gold mining operation (Chinese Diggings). Most of this area is in the reservoir basin. Some of the resulting disturbed area has revegetated, but most of the area is covered by tailings and barren land surfaces.

Elkhorn Creek flows in a narrow canyon through most of its course. It opens into the Boulder valley about four miles from the Boulder River. In the next two miles, most of the streamflow is diverted for irrigation or is absorbed by pervious pediment gravels. The last two miles of the stream channel are usually dry. The upper 73 percent of the Elkhorn Creek Watershed is in the Deer Lodge National Forest. Most of this area is steep and covered with coniferous forest. Development of the upper watershed is primarily restricted to the area around the community of Elkhorn. Abandoned mines and old buildings are the only signs of extensive subsurface mining activities that flourished in the late 1800's.

Soils of the benchlands and flood plain lowlands of the Boulder valley support almost all the cropland in the watershed. Soils on the bottomland, adjacent to the Boulder River, are formed in moderately deep, fine or moderately textured alluvium overlying gravel. They are associated with varying degrees of wetness, but are adapted to the production of native hay and pasture. Soils on higher-lying benches are formed in medium-textured alluvium and are underlain by gravel at various depths. Bench soils 20 or more inches deep to gravel and on slopes up to 8 percent are irrigable. These soils are adapted to the production of hay and small grain crops. Bench soils less than 20 inches deep to gravel and those with slopes over 8 percent are used for range.

The watershed contains 15,100 acres (6.7 percent) of cropland. About 7,300 acres (48 percent) of the cropland are presently being irrigated. The irrigated area contains 4,000 acres of Class II and III cropland and 3,300 acres of Class IV, V, and VI land being cropped. Most of the Class II and III lands are on the benches and do not receive a reliable irrigation water supply. Most of the Class IV, V, and VI bottomlands are subject to overflow or high water table conditions. About 7,800 acres of Class II and III dry cropland on the valley benches are suitable for irrigation, along with more than 2,000 acres of range-land. No wetlands of Classes III, IV, and V occur in the watershed. 3/

Production from the irrigated cropland is primarily hay for winter livestock feed. A few acres are devoted to small grain production.

The Boulder River is a typical mountain snowpack-fed stream. The U. S. Geological Survey maintained streamflow records on the Boulder River from 1929 to 1971. The USGS gage site is located about two miles downstream from the city of Boulder and about one mile upstream from the confluence of the Little Boulder River. Annual peak flows normally occur during May and June. An average year (50 percent chance) peak flow in the Boulder River is about 1,100 cfs. Flows at the USGS gage diminish to about 30 cfs by late July and August. Existing irrigation diversions during this period dry up about 12 miles of the river. Extensive reuse of return flows is common. The average annual yield of the Boulder River at the USGS gage is about 87,500 acre-feet. About 64 percent of the annual yield occurs during May and June. Average winter flow of the Boulder River at the USGS gage is about 30 cfs.

The Little Boulder River also is a typical mountain snowpack-fed stream. The Soil Conservation Service maintained streamflow records on the Little Boulder River from 1963 to 1968. The average annual yield of the Little Boulder River is about 15,700 acre-feet. An average year (50 percent chance) peak flow in the Little Boulder River is about 250 cfs. Minimum fall and winter flow in the Little Boulder River is about 4 cfs.

Filed appropriation rights for irrigation water in the watershed area total about 500 cfs. Total water appropriations filed on the Boulder River are about 3,100 cfs. Presently, spring flood flows are diverted prior to the beginning of the growing season in an attempt to recharge the soil profile by wild flooding.

3/ Classification is based on U. S. Department of the Interior, Fish and Wildlife Service Circular 39, "Wetlands of the United States."

Surface waters in the watershed are generally clear, cold, and of good quality (11). During periods of low flow, water temperatures rise and the quality decreases. The water is low in dissolved solids with the most common dissolved salt being calcium bicarbonate. These waters are typical of drainages composed of granitic bedrock. Tests by the Montana Department of Health and Environmental Sciences of water samples collected from the Boulder River during the period 1972-1974 show a range of 90 milligrams per liter (mg/l) to 330 mg/l total dissolved solids (TDS) (25). The lower value of TDS was determined from a sample taken near the SCS gage site on the Boulder River. The higher value of TDS was determined from a sample taken below the project area (about 40 miles downstream from the USGS gage site). Tests by the Montana Department of Health and Environmental Sciences of water samples collected by the Service from the Little Boulder River in 1973 show a range of 67.2 mg/l TDS in June to 125.5 mg/l TDS in August. The water samples were all taken near the gage site on the Little Boulder River.

The Boulder River above Boulder is polluted by drainage from mining operations in the upper watershed outside the project area. Dissolved heavy metals and heavy-metal-bearing sediments enter the Boulder River in the vicinity of Basin (8.2 miles upstream from Boulder). Principal pollution sources are the Crystal Mine, on a tributary to Cataract Creek which enters the Boulder River just downstream from Basin and the Comet Mill tailings, located along High Ore Creek which enters the Boulder River about 3.5 miles downstream from Basin (25). The major heavy metals present are iron, zinc, copper, lead, cadmium, and arsenic.

Major water quality impairment of the Boulder River drainage occurs between Basin and Boulder. However, occasional flushes of pollutants affect the Boulder River all the way to its confluence with the Jefferson River. The sporadic high concentrations of heavy metals have been attributed to erosion of large volumes of old mill tailings from the Comet Mine during high streamflow periods (25). Acid mine seepage from inactive mines in the Basin area are perennial and therefore contribute heavy metal pollutants throughout the year. The acid mine seepage pollution is oxidized and diluted rapidly as it moves downstream and therefore adverse effects are minor below the city of Boulder. The Montana Department of Health and Environmental Sciences has classified all the streams in the watershed as B-D₁. 4/

4/ State Classification B-D₁ indicates water that shall be maintained suitable for drinking, culinary, and food processing purposes after adequate treatment equal to coagulation, sedimentation, filtration, disinfection, or other treatment necessary to remove naturally present impurities. These waters shall be maintained suitable for bathing, swimming, and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl, furbearers, agricultural, and industrial uses (15).

According to SCS stream channel classification, most of the Boulder River in the project area is classified "N" (well-defined, unmodified channel). Portions of the channel near the city of Boulder have been realigned and are classified "M" (previously modified channel--early days to present). It is a perennial "Pr" stream.

The Little Boulder River is classified "N" and "Pr" except for a section of modified channel about 2,000 feet long in the lower watershed. Elkhorn Creek is classified "N" and "Pr" except for approximately four miles of the lower channel, which is "I" (Intermittent). All the other streams in the watershed are Intermittent ("I") or Ephemeral ("E") in the mountains and Ephemeral where their channels cross the benchlands.

Ground water for domestic use is available in the valley fill deposits of the watershed. Limited water supplies can be obtained from the alluvial and lakebed material underlying the benchlands. Ground water from the Boulder valley recharges the Boulder River along most of its course.

High mountain areas composed of hard bedrock materials contain very limited ground-water resources. Limited water supplies can be obtained in areas of low relief where fracturing and faulting have occurred.

High ground-water table conditions exist along the Boulder River flood plain in the project area. These conditions are caused by overland and subsurface return flows from excessive irrigation and spring floods.

A thermal spring has been developed in an area near the mouth of the Little Boulder River. Flows from the spring are used to heat the Diamond "S" Ranchotel and its steam room and hot pool facilities. The water temperature of this spring is 160°F (71°C). This area has been identified as a Known Geothermal Resource Area (KGRA).

Current geologic information indicates abundant deposits of sand, gravel, and impervious clay materials occur throughout the Boulder valley. Durable rock occur in the mountainous areas of the watershed.

Extensive lode deposits have been mined in the Elkhorn Mountains. Mining began in 1875 and most of the activity has been in the vicinity of the village of Elkhorn. The mines have produced silver, lead, gold, zinc, and copper valued at \$32,000,000 (14). Mines in the area are operated intermittently at the present time. Placer gold deposits have been developed in numerous areas in the watershed. Deposits in the lower reaches of Elkhorn Creek and the Little Boulder River have yielded significant quantities of gold in the past.

Placer mining operations on the Little Boulder in the proposed reservoir area were active from the late 1800's to the early 1940's. Water was diverted from the Boulder River for hydraulic mining. This placer deposit is known locally as the "Chinese Diggings"--a deposit primarily worked by Chinese laborers. Most of the mined area is covered by tailings and barren land surface. Recent private investigations have shown that some gold is present in nearby gravel deposits. These deposits are covered by deep overburden, making recent mining attempts unsuccessful.

The climate of the watershed is typical of southwestern Montana where local ranges of the Rocky Mountains greatly influence climatic conditions. Winters in general are cold with occasional mild periods which melt the snow accumulation in the valleys. Summers are characterized by wide daily temperature variations, abundant sunshine, low relative humidity, and occasional thundershowers.

Weather records at Boulder are representative of the Boulder valley. The average annual precipitation is 11.3 inches for the period 1940 to 1971. About 21 percent of the average annual precipitation occurs in June. About 50 percent of the total precipitation occurs during the period June-September.

Temperatures at Boulder vary from a record low of -39°F to a record high of 105°F with a mean annual temperature of 41.3°F. For the hottest month, July, the average daily maximum is 81°F and the average daily minimum is 46.3°F. During the coldest month, January, the average daily maximum is 31.9°F and the average daily minimum is 8.4°F. The average frostfree period is 115 days between the last killing frost on about May 24 and the first killing frost on about September 15.

The mountainous areas of the watershed are subject to much lower temperatures and higher precipitation than the Boulder valley. There is one snow survey station in the watershed and four others in the Boulder River drainage. Data from these stations indicate the average annual precipitation in the upper parts of the watershed is approximately 30 inches. The snowmelt from the mountains provides most of the stream-flow of the Boulder River and its major tributaries.

Present and Projected Population

The 1970 census lists the population of Jefferson County as 5,238 (5). The population of Jefferson County in 1960 was listed as 4,297. Based on OBERS projections of economic activity (prepared by the U. S. Water Resources Council), the population in 2020 will be 7,642 (3). The number of minority residents in Jefferson County is below a minimum level and is not disclosed in census data (7).

Economic Resources

Land ownership in the watershed:

<u>Owner</u>	<u>Acres</u>	<u>Percent</u>
Private	107,100	47.9
Federal		
National Resource (BLM)	22,500	10.0
National Forest (FS)	84,000	37.6
State of Montana	10,000	4.5
TOTAL	223,600	100.0

Cattle ranching is the major enterprise in the watershed. There are 19 ranch units (25 landowners--33 owner-operators) in the benefited area of the watershed averaging approximately 5,690 acres. A typical ranch produces about 360 calves per year. Ranches in the watershed produce about 7,200 head of beef cattle for the nation's markets each year. Ranching operations in the Boulder valley date back to the mid-1860's.

The principal crops grown in the watershed (with limited irrigation) as reported by local ranchers are:

<u>Crop</u>	<u>Yield Per Acre</u>
Alfalfa	2.5 tons
Oats	70 bushels
Oats hay	2.0 tons
Irrigated & subirrigated pasture	1 AUM <u>5</u> / + 0.75 ton

Current land values in the watershed by land use are estimated to range from \$80 to \$125 per acre for rangeland and \$300 to \$500 per acre for irrigated cropland (8).

Ranches in the watershed have access to markets on Highway 281 and all-weather gravel roads.

5/ 1 AUM--1 animal unit worth of grazing=1 1,000-pound cow with or without calf at side for 1 month.

The level of unemployment according to 1970 census data in Jefferson County is 4.5 percent. The level of unemployment in 1960 was listed as 3.0 percent. Median family income is \$8,520 per year. Percentage breakdown of family income is (7):

<u>Income Class</u>	<u>Percent</u>
Less than \$3,000	9.2
\$3,000 to \$4,999	12.2
\$5,000 to \$6,999	13.1
\$7,000 to \$9,999	31.1
\$10,000 to \$14,999	24.3
\$15,000 to \$24,999	9.1
\$25,000 or more	1.0

The number of persons below the low income level is 576 or 11.0 percent of the population in Jefferson County. Median family income for farms and ranches is \$8,705. There was 14.2 percent of the farm population below the low income level in 1969 (7). Average income figures for Jefferson County are estimated to be above incomes for people in Boulder. The desire for rural living, along with lower taxes, has resulted in significant numbers of workers living in Jefferson County but commuting to jobs in Helena or Butte where salaries are higher.

The watershed and Jefferson County are in the Headwaters Resource Conservation and Development project area.

The city of Boulder is the location for the Boulder River School and Hospital. This State institution provides services for mentally retarded persons. About 600 persons reside at this institution. The Superintendent of the Boulder River School and Hospital also serves as State Coordinator for the Montana Division of Mental Retardation which works with local councils to assist retarded persons. Although more services are becoming available on a local basis, the Boulder River School and Hospital provides specialized facilities and services for local associations. A day camp located within the watershed provides an outdoor recreational experience for retarded persons. It is one of the special services being provided by institution staff and volunteer workers. Many persons travel to Boulder as a result of the Boulder River School and Hospital.

Plant and Animal Resources

The Boulder River Watershed within the project area is a mixture of cropland, rangeland, and woodland with rangeland predominating. Cropland consists of bottomland and benches mostly in pasture and hay with some land in small grain.

The woodland may be divided into three types. The Rocky Mountain juniper/Douglas-fir forest type is found in a relatively dry environment on south- and west-facing slopes. Distinguishing species of this type are Rocky Mountain juniper, Douglas-fir, big sagebrush, snowberry, lupine, yarrow, pinegrass, elk sedge, and bluegrasses.^{6/}

The north- and east-facing slopes, comprising the second woodland community, support a dense lodgepole pine/Douglas-fir forest type. Species which distinguish this type are lodgepole pine and Douglas-fir with an understory of big whortleberry, shinyleaf spiraea, rose spiraea, Utah honeysuckle, showy aster, grouse whortleberry, pinegrass, elk sedge, and bluegrasses.

The third woodland type, subalpine forest, occurs at higher elevations in rough mountainous areas. Subalpine fir, Engelmann spruce, and whitebark pine are the distinguishing species. Understory species within this type include elk sedge, mountain brome, pinegrass, grouse whortleberry, Labrador tea, red mountainheath, Idaho fescue, bent grasses, bluegrasses, woodrush, aster, bluebell, Lewis monkeyflower, and lupine.

Rangelands occur throughout the Boulder River Watershed. Rangelands in the upper elevations are composed primarily of Silty and Shallow range sites in the 15-19-inch precipitation zone. Plant species are predominantly bluebunch wheatgrass, Idaho fescue, needleandthread, prairie junegrass, big sagebrush, and forb increasers.

The valley benchlands and upper terraces consist of Limy, Shallow, and Very Shallow range sites in a 10-14-inch precipitation zone. Dominant plant species are needleandthread, blue grama, Sandberg bluegrass, bluebunch wheatgrass, cactus, weedy forbs, rabbitbrush, sageworts, and broom snakeweed.

Valley bottomlands, characterized by moderate to high water tables and run-in water, generally classify as subirrigated, saline lowland or wetland range sites. They support a plant community of basin wildrye, inland saltgrass, western wheatgrass, silver sagebrush, greasewood, buffaloberry, and rose.

A belt of riparian (streambank) vegetation is generally found along the watercourses of the valley bottomlands. This area is characterized by a fairly stable zone of high soil moisture which supports greater amounts and variety of vegetation than found on the lands more distant from the watercourse.

^{6/} See pages E-25 and E-26 for Latin names of plants and animals.

Riparian plant communities are specialized, consisting of species which tolerate saturation of the soil, as well as periodic flooding. By their nature, they are intimately associated with the watercourse and become an inseparable partner in the land-water combination of the riparian environment.

Such environments in the Boulder River flood plain generally range from one-quarter to one-half mile in width throughout the 34-mile reach of river within the project area. Density of riparian vegetation varies from scattered patches to extensive dense thickets. Shrub and tree species characterizing these thickets along the Boulder River include willow, black cottonwood, aspen, thinleaf alder, redosier dogwood, rose, and birch. Grass and grasslike species are sedges, baltic rush, redtop, Kentucky bluegrass, saltgrass, and scratchgrass.

Riparian vegetation along the lower three-mile reach of the Little Boulder River is similar in character but less extensive than that occurring along the main Boulder. Its average width is approximately 300 feet, and like that of the Boulder, its density varies from scattered patches to more extensive thickets. Plant species occurring along the Little Boulder River are essentially the same as those found along the Boulder River.

Little data are available on the aquatic plant community of the Boulder River Watershed. Typical vegetation consists of filamentous algae, pondweed, water buttercup, and elodea.

A variety of species inhabit the riparian environment. They are dependent mainly on aquatic or streambank habitats for food, shelter, and reproduction. Stream riffles are used by fish for spawning, while undercut banks and overhanging vegetation furnish shelter. Small fish, aquatic insects, and streamside vegetation provide food for birds as well as excellent nesting sites. Frogs, crayfish, small fish, invertebrates, and aquatic vegetation provide a food source for furbearing animals while streambanks afford suitable denning sites.

Birds of the riparian environment include the belted kingfisher, dipper, goldeneye, great blue heron, red-tailed hawk, killdeer, black-billed magpie, as well as numerous songbirds. Furbearers include mink, muskrat, river otter, and beaver.

Fishery resources of the watershed are largely confined to the Little Boulder and Boulder Rivers. Other streams are intermittent or ephemeral and not suited for fish habitat.

The Little Boulder River is a typical mountain stream having pools, riffles, and sand and gravel bottoms. In this area are numerous beaver ponds that provide favorable habitat for trout.

The Little Boulder River contains populations of brown trout, rainbow trout, brook trout, and mountain whitefish. Brown trout exceeding 14 inches in length have been observed in the lower reaches of the river. Nongame fishes include the white sucker, mountain sucker, dace, and mottled sculpin. Most of the stream lies within the Deer Lodge National Forest where public access is good and recreational facilities are available.

The Boulder River supports populations of brown trout, brook trout, and rainbow trout. Brown trout exceeding four pounds have been taken from the river. Nongame fishes include the white sucker, mountain sucker, dace, and mottled sculpin.

Existing low populations of fish and aquatic invertebrates in the Boulder River reflect the quality of water. Sporadic high concentrations of mine wastes are sufficient to depress both fish populations and benthic organisms. Heavy metal pollutants occur in the Boulder River and severe dewatering of 12 miles of stream by numerous irrigation diversions has occurred in past years. This has been substantiated by fish population analyses of selected reaches of the river conducted during the summer of 1974 by the Montana Department of Fish and Game (22).

Several large springs in the lower reaches of the river increase the streamflow below the project boundary for approximately 10 miles to its confluence with the Jefferson River. The Montana Department of Fish and Game rates this 10-mile reach as a class 3 (of regional significance) trout stream based on the Montana Stream Classification Map (23).

Fishery production figures for the Boulder River below the watershed average about 54 pounds per surface acre standing crop, while in the project area, which includes portions that are periodically dry, production averages about 7-10 pounds per surface acre standing crop (22).

The Boulder River valley and surrounding mountains provide good wildlife habitat. Rocky Mountain elk and mule deer winter in the foothills along the Little Boulder River. An excellent population of white-tailed deer resides along the mainstem of the Boulder. Some pronghorn antelope are found over the rangeland and irrigated areas where they provide some limited hunting. Sharp-tailed grouse, gray partridge, and ring-necked pheasant frequent the cultivated land and also provide some hunting opportunities. A few mallards nest along the Boulder River and jump shooting is a popular sport during the fall migration. Nongame species such as bobcats, coyotes, cottontails, jackrabbits, and numerous small rodents are common throughout the watershed. No rare or endangered species are known to reside in or utilize the project area (10).

Public access to fish and wildlife resources on private land is restricted primarily to fishing. Landowner-fisherman relationships have been good in the past and public access is generally available throughout the watershed.

PLANT NAMES (Common and Latin plant names)

TREES

Aspen	<u>Populus tremuloides</u>
Birch	<u>Betula spp.</u>
Black cottonwood	<u>Populus trichocarpa</u>
Douglas-fir	<u>Pseudotsuga menziesii</u>
Engelmann spruce	<u>Picea engelmanni</u>
Lodgepole pine	<u>Pinus contorta</u>
Rocky Mountain juniper	<u>Juniperus scopulorum</u>
Subalpine fir	<u>Abies lasiocarpa</u>
Thinleaf alder	<u>Alnus tenuifolia</u>
Whitebark pine	<u>Pinus albicaulis</u>
Willow	<u>Salix spp.</u>

SHRUBS

Big sagebrush	<u>Artemisia tridentata</u>
Big whortleberry	<u>Vaccinium membranaceum</u>
Buffaloberry	<u>Shepherdia argentea</u>
Broom snakeweed	<u>Gutierrezia sarothrae</u>
Douglas rabbitbrush	<u>Chrysothamnus viscidiflorus</u>
Fringed sagewort	<u>Artemisia frigida</u>
Greasewood	<u>Sarcobatus vermiculatus</u>
Grouse whortleberry	<u>Vaccinium scoparium</u>
Labrador tea	<u>Ledum glandulosum</u>
Red mountainheath	<u>Phyllodoce empetrifolia</u>
Redosier dogwood	<u>Cornus stolonifera</u>
Rose	<u>Rosa spp.</u>
Rose spiraea	<u>Spiraea rosea</u>
Shinylead spiraea	<u>Spiraea lucida</u>
Snowberry	<u>Symphoricarpos spp.</u>
Utah honeysuckle	<u>Lonicera utahensis</u>

GRASSES AND GRASSLIKE PLANTS

Bent grasses	<u>Agrostis spp.</u>
Bluebunch wheatgrass	<u>Agropyron spicatum</u>
Blue grama	<u>Bouteloua gracilis</u>
Canby bluegrass	<u>Poa canbyi</u>
Common cattail	<u>Typha latifolia</u>
Elk sedge	<u>Carex geyeri</u>
Idaho fescue	<u>Festuca idahoensis</u>
Indian ricegrass	<u>Oryzopsis hymenoides</u>
Mountain brome	<u>Bromus marginatus</u>
Needlegrass	<u>Stipa spp.</u>
Needleandthread	<u>Stipa comata</u>
Needleleaf sedge	<u>Carex eleocharis</u>
Pinegrass	<u>Calamagrostis rubescens</u>
Prairie junegrass	<u>Koeleria cristata</u>
Sandberg bluegrass	<u>Poa secunda</u>
Scratchgrass	<u>Muhlenbergia asperifolia</u>
Slender wheatgrass	<u>Agropyron trachycaulum</u>
Threadleaf sedge	<u>Carex filifolia</u>
Western wheatgrass	<u>Agropyron smithii</u>
Woodrush	<u>Luzula spp.</u>

FORBS

Dalmatian toadflax
Baldhead sandwort
Bluebell
Douglas phlox
Elodea
Lewis monkeyflower
Lupine
Pondweed
Rose pussytoes
Showy aster
Spreading fleabane
Sulfur wildbuckwheat
Water buttercup
Yarrow

Linaria dalmatica
Arenaria congesta
Mertensia spp.
Phlox douglassii
Elodea occidentalis
Mimulus lewisii
Lupinus spp.
Potamogeton spp.
Antennaria rosea
Aster conspicuus
Erigeron divergens
Eriogonum umbellatum
Ranunculus aquatilis
Achillea millefolium

ANIMAL NAMES (Common and Latin animal names)

MAMMALS

Beaver
Bobcat
Cottontail rabbit
Coyote
Jackrabbit
Mink
Mule deer
Muskrat
Pronghorn antelope
River otter
Rocky Mountain elk
White-tailed deer

Caster canadensis
Lynx rufus
Sylvilagus spp.
Canis latrans
Lepus townsendi
Mustela vison
Odocoileus hemionus
Ondatra zibethica
Antilocapra americana
Lutra canadensis
Cervus canadensis
Odocoileus virginianus

BIRDS

Ring-necked pheasant
Belted kingfisher
Black-billed magpie
Dipper
Goldeneye
Gray partridge
Great blue heron
Killdeer
Mallard duck
Red-tailed hawk
Sharp-tailed grouse

Phasianus colchicus
Megaceryle alcyon
Pica pica
Cinclus mexicanus
Bucephala spp.
Perdix perdix
Ardea herodias
Charadrius vociferus
Anas platyrhynchos
Buteo jamaicensis
Pedioecetes phasianellus

FISHES

Brook trout
Brown trout
Dace
Mottled sculpin
Mountain sucker
Mountain whitefish
Rainbow trout
White sucker

Salvelinus fontinalis
Salmo trutta
Rhinichthys spp.
Cottus bairdi
Catostomus platyrhynchus
Prosopium williamsoni
Salmo gairdneri
Catostomus commersoni

Recreational Resources

Outdoor recreational use in the watershed is limited. There are no plans for recreational development listed in the Montana Statewide Outdoor Recreation Plan (27).

A Forest Service camp site exists on the Little Boulder River about 4.3 miles above the proposed dam site. The campground covers approximately two acres of land and provides facilities primarily for picnicking. Improvements in the campground consist of seven picnic units and two camp units. Access to the campground is by a narrow, unsurfaced Forest Service road which is not maintained during winter months. The proposed reservoir will not encroach on the campground.

The Boulder River School and Hospital maintains a day use camp for its patients. This camp, developed along the Little Boulder River, is used to provide an outdoor recreational experience. The camp includes bridges across the stream, paths, and sanitary facilities. About 48 percent of the patients take part in recreational programs. The summer day camp was sponsored in part by the Joseph P. Kennedy, Jr., Foundation and is an integral part of the institution's recreational therapy program.

The Diamond "S" Ranchotel has a hot springs, swimming pool, and riding horses for the use of their guests.

Recreational activity is associated primarily with fish and wildlife resources, including hunting of big game, upland game birds, and waterfowl. A moderate amount of fishing takes place in the watershed on the Little Boulder and Boulder Rivers. Access for fishing and waterfowl and big game hunting requires landowner permission on private land. Ranchers in the watershed have generally afforded access across private lands to utilize the recreational resources on the adjoining public lands.

Archeological, Historical, and Unique Scenic Resources

The watershed does not contain any place listed on the National Register of Historic Places. No reference to unique scenic values in the watershed is made in the Montana Statewide Outdoor Recreation Plan (27).

An archeological field investigation was conducted in the proposed reservoir and construction areas by the Montana Statewide Archeological Survey. These studies revealed two tipi rings near the reservoir. Their location was recorded and it was indicated that they were not of further significance (13). In consultation with the Montana State Historic Preservation Officer, an old stage station was noted to have existed near the proposed dam. An archeological field investigation of this site was conducted by the Montana Statewide Archeological Survey (24). No structures exist aboveground to mark the site; however, there is evidence of old foundations and walkways. Archival research has been conducted by the Montana Statewide Archeological Survey. Additional archeological testing has been recommended by the Secretary of the Interior through the National Park Service to further evaluate this site.

The old mining community of Elkhorn in the northeastern part of the watershed still bears evidence of early mining days. Some buildings, including the Fraternity Hall, have been restored (14). The community is inhabited year-long by a few families. This area attracts visitors interested in mining history.

Soil, Water, and Plant Management Status

Technology in sprinkler irrigation permits farmers and ranchers in the watershed to shift irrigation to lands where the better soils occur. Such lands are dry cropland or pasture. Soils in the irrigated area are alluvial and have intake rates varying from one inch per hour to three inches per hour and have water-holding capacities of four to ten inches. Land slopes are up to eight percent. Sprinkler irrigation is the only method by which adequate efficiencies can be attained on many of the soils having these combinations of intake rate, water-holding capacities, and slopes. Flood irrigation is planned on suited lands. Currently, ten percent of the irrigable land in the watershed is under sprinkler irrigation.

Individual irrigation canals and systems allow irrigation by flooding of those lands below the canals. Some areas now irrigated and used for hay production are marginal (Class IV, V, and VI land) due in part to a high water table. Much of the Class II and III irrigable land is now either dry cropland or pasture.

The Jefferson Valley Conservation District was organized in August 1948. Since that time, water resource developments and shifts to more intensive farming were paralleled by increased use of farm conservation practices. Presently, 25 of the 45 operating units covering about 86 percent of the private land in the watershed are cooperators of the Conservation District. Basic conservation plans have been prepared by 17 cooperators covering about 58 percent of the watershed. Approximately 40 percent of the planned practices included in basic conservation plans have been applied by the cooperators.

Adequate conservation land treatment has been accomplished on about 20 percent of the cropland, 50 percent of the pasture and hayland, and 50 percent of the rangeland in the watershed. Rural fire protection for the watershed is available. Fire protection for the forested lands in the watershed is coordinated by the State Forester and the U. S. Forest Service.

Projects of Other Agencies

The Boulder River is tributary to the Jefferson River in the Missouri River Basin. There are several multipurpose reservoir developments on the Missouri River, primarily for flood control and power generation. These projects have been developed by U. S. Army Corps of Engineers, Montana Power Company, and U. S. Bureau of Reclamation.

The State of Montana is preparing a statewide water resources plan in line with state policy which is aimed at developing, protecting, and conserving water resources in Montana.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

The most significant land and water resource problem in the watershed is a lack of a reliable late season irrigation water supply. The irrigation water supply is dependent primarily on the flows of the Boulder River which diminish rapidly after high spring and early summer runoff. Diminished, late season flows cause inefficient use of water and land resources which results in less than optimum economic conditions.

Valley bottomland (irrigated and subirrigated) is used concurrently for production of grass hay and pasture. The use of valley bottomlands for hay production and pasture does not achieve potential production for either hay or pasture. Current production per acre is 0.75 ton of hay plus one AUM of grazing. Alfalfa hay on the benches produces 2.5 tons per acre.

More intensive use of resources is needed to bring about balanced feed and forage production and increased net returns. Ranches generally lack a balanced feed and forage base. Livestock on some ranches are trucked to other areas outside the watershed for summer pasture. Some ranches purchase hay for winter feed. This lack of balance in ranch operations contributes to higher costs and lower operating efficiencies.

The ability of landowners and operators to install needed land treatment measures has been curtailed by inadequate and undependable late season irrigation water supplies.

Floodwater Damage

Flood damages in the watershed are minor. These damages are primarily streambank erosion, with swamping and overflow on the lowlands adjacent to the Boulder River. Damages occur annually during spring runoff. Flood damages along lower reaches of the Little Boulder River also include occasional road and fence damage.

Erosion Damage

Erosion rates in the watershed are tabulated for the major land use categories:

	Land Use		
	Forested Land	Rangeland	Cropland
Acres	74,400	134,100	15,100
% Watershed	33.3	60.0	6.7
Erosion Rates (t/ac/yr)	0.017	0.068	0.51
Average Annual Allowable Soil Loss (t/ac/yr) <u>7/</u>	3	2	3
Sheet Erosion (%)	79	95	90
Gully Erosion	1	5	10

Agricultural production and net incomes in the watershed are not affected by these rates.

Sediment Damage

Sedimentation rates in the watershed are low. Sediment yield rates in acre-feet per square mile per year are tabulated for the major land use categories in the watershed:

<u>Land Use</u>	<u>Sediment Yield Rate</u>
Forested land	less than 0.01 acre-feet/sq.mi./yr.
Rangeland	0.01 to 0.10 " " "
Cropland	0.10 to 0.20 " " "

Local areas with higher sedimentation rates occur in the watershed. These are areas of naturally higher geologic erosion. In many cases, cropping and grazing practices have accelerated geologic erosion.

Sedimentation in the watershed has little effect on the functioning ability of reservoirs, distribution systems, drainage systems, irrigation developments, or transportation systems. Much of the sediment is carried

7/ Average annual allowable soil loss is the maximum on-site loss which can be tolerated while maintaining long-term production of the soil. (Soils Advisory #6, February 6, 1973)

out of the watershed into the Jefferson River. The Jefferson River at Silver Star has a measured average flow of 2,000 cubic feet per second and carries 62,741 tons of suspended sediment per year. This measuring point is upstream from the junction of the Boulder River and Jefferson River. Suspended sediment in the Boulder River is less than 400 tons per year. This project will have little to no impact on the sediment concentration in the Jefferson River.

Local higher sediment yield areas directly affect the Boulder River only during infrequent, high-intensity summer storms. During these events, however, the streambed of the Boulder River is locally charged with sands. The Boulder River does not usually have the capacity to flush the sands. Sands adversely affect fishery production in at least two to three miles of the Boulder River in the vicinity of Nigger Hollow.

Irrigation Problems

Ranch owners and operators in the watershed presently irrigate about 7,300 acres. Of this, 3,300 acres are marginal lands classed as IV, V, or VI. These Class IV, V, and VI lands are found mainly along the Boulder River and adjacent benches. The bottomlands are subject to overflows during spring runoff. Soil survey data indicate there are more than 13,800 acres of Class II and III irrigable land in the watershed. Of this, there are 4,000 acres presently irrigated.

The principal source of water for irrigation is the Boulder River with the Little Boulder River and Elkhorn Creek contributing lesser amounts. Average annual discharge of the Boulder River is 121 cubic feet per second (cfs) (1). Average peak discharge is about 1,100 cfs and occurs during spring snowmelt runoff. Average fall and winter minimum discharge at the USGS gage is about 30 cfs. Only lands with early water rights receive more than one irrigation.

Present irrigation systems are predominantly surface irrigation. Some sprinkler systems have been installed in recent years. Soils in the irrigated area are alluvial and have intake rates varying from one inch per hour to three inches per hour and have water-holding capacities from four to ten inches. Land slopes range up to eight percent. Sprinkler irrigation is the only method by which adequate efficiencies can be attained on many of the soils in the upland areas.

Numerous small irrigation diversions have been built along the Boulder River. Many of these diversions require temporary dams across the river. Although most of the canals have sufficient capacity during high flows, they lack adequate control gates, turnouts, and drop structures. These numerous diversions require additional time and labor for maintenance and are used to redirect irrigation return flows, thereby drying up many reaches of the river. During low flows it is difficult to get water into the diversions without modification of the stream channel.

Overirrigation during the early growing season results from an effort to use water while it is available. Excessive irrigation causes erosion problems and contributes to the high water table conditions on the valley lands along the Boulder River. Less efficient irrigation methods have persisted due to a lack of dependable full season water supply. Crop rotations have lacked adequate pasture and hayland to balance ranch operations. Present irrigation methods contribute to ponded and stagnant water, increasing mosquito production along the Boulder River.

Total dissolved solids in the Boulder River range from 90 milligrams per liter (mg/l) near the confluence with the Little Boulder to 330 mg/l 40 miles downstream (16).

Recreational Problems

Dewatering and the presence of heavy metal pollutants presently contribute to poor fishing in much of the Boulder River. Low flows in the Boulder River result in high water temperatures detrimental to trout during August and September. Temperatures as high as 82°F. have been recorded by the Montana Department of Fish and Game (22).

There is a lack of flat water recreational resources in and around Boulder. The nearest accessible lakes or reservoirs offering water-based recreational opportunities are Canyon Ferry Reservoir, 45 miles north; Georgetown Lake, 75 miles southwest; Ennis Lake, 80 miles south; Harrison Lake, 60 miles south; Hauser Lake, 45 miles north; Holter Lake, 65 miles north; Lake Helena, 45 miles north; and Silver Lake, 75 miles southwest.

The principal towns within a fifty-mile radius are (2):

<u>Town</u>	<u>Population</u>
Butte	23,368
Helena	22,730
Anaconda	9,771
Deer Lodge	4,306
TOTAL	60,175

Small towns and rural population account for an additional 46,000 persons (12). Total population within a fifty-mile radius is 106,175.

Plant and Animal Problems

Present irrigation demands cause reaches of the Boulder River to become dry during the latter part of the irrigation season. The dewatering along with heavy metal pollution limits fish habitat, movements, and food production necessary to sustain viable trout populations.

Dry stream and low flow conditions reduce riparian vegetation in the Boulder valley. Existing pasture management practices concentrate livestock on valley bottomlands for prolonged periods, damaging riparian vegetation, decreasing streambank stability, and reducing fish and wildlife habitat. There has also been a trend toward increasing the area of bottomland pastures and haylands by clearing riparian vegetation.

A need exists for improving fish habitat in the Boulder River through increased late summer flows and pollution abatement. If fish populations in the Boulder River are to be significantly increased, streambank vegetation protection and enhancement are essential.

Infestations of dalmatian toadflax occur within and around Boulder, along the valley highway, and other roadsides. Left uncontrolled, these infestations will spread to cropland and rangeland.

Economic and Social Problems

In Jefferson County, 1970 census data indicate median family income was \$8,520; mean family income was \$9,592; and per capita income was \$2,229. In Montana during the same period, median family income was \$8,072; mean family income was \$8,899; and per capita income was \$2,444. For the United States, median family income was \$9,586, and per capita income was \$3,119. Eleven percent of the population in Jefferson County was below the low income level. The rate of unemployment in Jefferson County was 4.5 percent. About 30 percent of the ranches in Jefferson County employ more than 1.5 man-years of labor. Between 1960 and 1970, employment in the Agricultural sector declined from 236 to 214 (9.3 percent) in Jefferson County (5) (6).

RELATIONSHIP TO LAND USE, POLICIES, AND CONTROLS

The watershed project has been identified as a potential development in the Type I Comprehensive Framework Study of the Missouri River Basin, 1969. The watershed project was recognized as an important project to be implemented in the Headwaters Resource Conservation and Development area. Jefferson County has recognized the potential development associated with the project. The project is a part of the long-range plan for the Jefferson Valley Conservation District. Montana Power Company is installing a three-phase electric power distribution system in the Boulder River valley.

There is no known or anticipated conflict with any local, state, or federal regulating agency involved in land and water resource use or water or air pollution authorities.

ENVIRONMENTAL IMPACT

Conservation Land Treatment

The proposed project will reduce sedimentation and erosion rates in the watershed. The reservoir will reduce sedimentation by three acre-feet per year. Land treatment and land use changes from dry cropland to irrigated cropland will reduce erosion and sedimentation from agricultural lands.

Planned grazing systems will reduce erosion and sedimentation from rangelands. The reduction in sedimentation in the Boulder River will have an insignificant effect on the Jefferson River and other downstream waters.

Land treatment measures, particularly those practices associated with sprinkler irrigation, will help bring about a shift of 2,800 acres of land capability Class IV, V, and VI from hay production to pasture production. About 5,700 acres of Class II and III dry cropland will be shifted to irrigated alfalfa hay and small grain production. About 500 acres of rangeland will be shifted to irrigated alfalfa hay and small grain production. Cropping practices will create border vegetation on the benchlands providing nesting areas and cover for nongame wildlife.

Surface overflow and flood irrigation of Class IV, V, and VI bottomlands will be reduced by a change in irrigation practices and application of individual farm drainage measures. The reduced surface irrigation overflow conditions will result in a reduction of mosquitoes.

Streamflow of the Boulder River in the benefited area will increase during the irrigation season. This will result from higher irrigation efficiencies, increased stream delivery of stored dual-use water for irrigation and fish and wildlife and projected return flows. By use of fewer diversions and sprinkler irrigation systems, return flows in the Boulder River are expected to increase. See figure 6, Appendix B.

The Jefferson County Weed Board is controlling infestations of dalmatian toadflax through application of chemical herbicides. Chemical control of these infestations, along with grazing management and crop rotation, will halt its spread to cropland and rangeland.

Structural Measures

The dam and reservoir will occupy 380 acres of land. This land consists of: 47.3 acres of bottomland used for pasture and hay production; 60.6 acres of riparian vegetation; 174.2 acres of benches and slopes used for rangeland; and 97.9 acres of disturbed land that have been hydraulically mined. The reservoir basin lies below the principal winter range for elk and mule deer in the Little Boulder Watershed; however, incidental use by the species within the reservoir basin will be lost.

The irrigation canal right-of-way will require 370 acres of land. Land use is: 210 acres of rangeland and 160 acres of cropland. There will be 220 acres of land committed to canals and access roads. There will be 150 acres of canal right-of-way used for borrow areas and work limits during construction.

Installation of the dam will have an impact on the flow regime of about five miles of the lower reach of the Little Boulder River. The reservoir will inundate about 3.6 miles of stream fishery. This represents an annual loss of 540 fisherman days. The reservoir will create a permanent pool which will have 165 surface acres, 2,700 acre-feet of storage, and a depth of 40 feet. This will create 8,340 fisherman days use. Flows below the reservoir in 1.6 miles of the Little Boulder River will be reduced to one cfs except during the irrigation season when the stream will be used to deliver up to 10 cfs of irrigation water. Fisherman use will be reduced by 240 fisherman days per year. Ground-water recharge to the Little Boulder River immediately below the dam will be blocked; however, releases from the reservoir will maintain live stream conditions. This change in flow regime will eliminate the fishery in the Little Boulder River below the reservoir. The dam will block fish movement on the Little Boulder River. The total stream fishery reduction will result in a loss of 780 fisherman days per year.

The project will increase the irrigated area in the watershed from 7,300 acres to 10,700 acres. Crop yields will be increased with the increased water supply and improved water management and associated production practices. Hay yields of 4.25 tons per acre are expected as compared with current production that now averages about 2.5 tons per acre. Irrigated pasture production is expected to increase from 0.75 ton of hay plus one AUM to six AUM's of grazing per acre. This increase in pasture production will allow ranchers in the watershed to graze livestock that currently are being grazed elsewhere.

Land resource use will shift from the irrigation of flood plain lowlands to higher bench croplands. More green area will be seen in the valley during the growing season. Irrigation efficiencies will be improved from an estimated existing value of less than 10 percent to 37 percent, thereby making more efficient use of the water resource.

The increased productivity of the cropland in the Boulder River valley will result in larger livestock numbers. The shift in irrigation from bottomlands to the benchlands will offer a change in livestock management practices. The combination of these two factors will result in heavier concentrations of livestock on bottomlands, but for shorter periods of time. The significant impact of this change in land use will be on the amount and quality of riparian habitat adjacent to the Boulder River. Larger numbers of livestock result in degradation of riparian vegetation. Shorter periods of bottomland use may result in improved riparian vegetation conditions. It is also expected that the land use changes will result in a reversal of the present trend of clearing riparian vegetation for pasture or hayland. Other pasture and hayland will be made available by the project and the brushy areas

will be needed as shelter for wintering livestock. The net effect should be the reduction of riparian habitat along the banks of the Boulder River due to increased livestock numbers.

Better livestock management practices could reduce the adverse impacts to riparian habitat that occur in heavy use areas.

Rehabilitation, relocation, and construction of irrigation canals on the benchlands will result in some disturbance of wildlife. Consolidation of canals will result in the loss of brushy vegetation along the abandoned canals. Brushy vegetation will become established on the new canals. Late season irrigation flows in the canals will provide water for wildlife that inhabit the benchlands; however, water for wildlife is generally not limited in this area.

Late summer flows in the Boulder River will be substantially increased due to the release of dual-use water that will serve the needs of downstream irrigation and fish and wildlife purposes. The project will eliminate the need for the existing 25 irrigation diversions through the installation of one main diversion structure, one smaller diversion, and about 12 individual pumping stations. Increased irrigation return flows and the irrigation water transported in the Boulder River will prevent total dewatering as now occurs. Increased flows in the river will enhance the stream fishery. Ground-water return flows will lower the water temperature in the lower 30 miles of the Boulder River in the watershed, enhancing the fishery resource. Reduced use and elimination of some present diversions will result in less blockage of the stream for fish movement and fewer channel bottom disturbances. As a result of the project, potential annual fisherman use of the Boulder River may be expected to increase by 800 fisherman days for the 30 miles of the Boulder River in the watershed. Increased flows in the Boulder River are expected to increase fish production in 10 miles of the Boulder River below the watershed. Sustained flows in the Boulder River are expected to improve streambank vegetation. Some dilution of heavy metal pollutants is expected to occur during the irrigation season as a result of irrigation releases. However, winter flows in the Boulder River below its confluence with the Little Boulder River will be decreased with a resultant possible increase in heavy metals pollution due to storage of Little Boulder River water.

With the plan, summer flows on the Boulder River are expected to increase by stream reach below the main irrigation diversion approximately as follows:

Boulder River Average Flows
During August
(cfs)

Reach - Miles	Present Flow <u>8/</u>	Flow With Project <u>8/</u>
0 - 4.5	20	76
4.5 - 8.5	11	28
8.5 - 18.5	3	35
18.5 - 28.5	7	37
28.5 - 34.0	26	53

About 2.3 miles of gravel road will be relocated along the north edge of the reservoir. Travel distances for persons traveling into the Little Boulder River Watershed will remain essentially the same. Construction of the 2.3 miles of road will require about 11 acres of forested land.

The project will require construction of 1.9 miles of 69 KV powerline to replace 2.3 miles, 0.75 mile of 12.5 KV powerline to replace 0.6 mile, and the removal of 0.8 mile of three-phase powerline. The 69 KV line located adjacent to the Little Boulder River is an auxiliary line for power in the Butte vicinity. This line will be relocated over a route going from the area just west of the Chinese Diggings to the upper end of the reservoir directly over the mountain. Minor disturbance of soil and range cover will be expected during construction of the new line. Clearing of 8.0 acres of trees and brush will be required. Visual impacts will be minimized through alignment of the relocated powerline.

The Boulder River School and Hospital day camp will be relocated from the Little Boulder River to an area adjoining the general recreational facilities area. See figure 7, Appendix B. Access will be provided from roads developed to serve the recreational area.

The removal of two solid waste dump areas on the north side of the reservoir basin will eliminate potential pollution to the Little Boulder River and the reservoir from surface runoff or ground-water movement.

The annual estimated use of recreational facilities will be 35,130 visitor days of general recreation. Annual fisherman visits to the reservoir are estimated at 8,340 (28). Recreational opportunities will be afforded to local residents, residents of the Boulder River School and Hospital, local associations of retarded persons throughout Montana, visitors of hospital residents, persons in nearby communities, and cross country travelers, including those traveling between Yellowstone and Glacier National Parks. Access to the reservoir for travelers of Interstate Highway 1-15 is readily available. The Boulder interchange on 1-15 is three miles north of the reservoir.

8/ Flows are average for the reach.

Additional development is expected on private lands adjacent to the project. Developments would include private housing, summer cabins, and overnight camping. Pollution problems would be increased. Additional pressures would be applied to wildlife populations.

More people will be attracted to the reservoir area as a result of this project. Recreational opportunities in the watershed will be expanded and enhanced to include water-based recreation on a 350 surface-acre reservoir with developed recreational facilities. Recreational use of the Forest Service campground on the Little Boulder above the proposed reservoir will increase.

Increased recreational use will increase traffic, dust, noise, and pollution in the watershed.

The reservoir will provide resting area for waterfowl. Protective fence around the recreational area will allow the growth and development of vegetation for wildlife habitat and scenic values. Livestock waste pollution to the Little Boulder River will be reduced.

Structural measures will result in visual impacts to lower portions of the Little Boulder River Watershed. The clear water reservoir, surrounded by steep, forested mountain slopes, will be scenic. The scenic value will be reduced late in the irrigation season when reservoir drawdown will expose nonvegetated shorelines and minor slump areas along steeper portions of the reservoir basin. The exposed shorelines will be primarily sandy beaches in the lower portion and rugged granite outcrops in the upper portion of the reservoir basin.

Smoke, noise, dust, and sediment pollution will be experienced during construction. Borrow areas above the high water line on the northern shore of the reservoir basin will be shaped, covered with topsoil, and seeded. These areas will be barren until vegetation becomes established.

Economic and Social

Employment generated by primary agricultural benefits is expected to be 8.9 man-years annually over the life of the project (100 years). The economic base within and around the watershed will improve due to the increased agricultural production and the higher net incomes of the ranchers in the watershed. Project operations and maintenance costs will generate an estimated 3.0 man-years of employment annually during the life of the project. Total permanent employment generated by the project is estimated at 11.9 man-years annually (1190 man-years during the project life). Employment generated by project construction is estimated to be 99 man-years during the installation period (7 years).

Population of Jefferson County is estimated to increase to 7,642 in 2020 (based on OBERS projections). It is expected that a greater percentage of this increase will occur in and around urbanized areas. Population of the rural areas is expected to remain stable or decrease slightly. The Boulder River Watershed will not affect these projected population trends. Per capita income in the watershed is expected to increase due to increased agricultural production, project construction, and maintenance costs.

The relocation of three families (10 persons), including one farm business, will place a hardship on those persons involved. Two families have the option of relocating on remaining land which overlooks the reservoir basin. One family will be required to look for new property. The quality of living for the relocated persons can be maintained or improved within the community.

With the improvements from land treatment and project installation, the tax base will be broadened. It is expected that the results over the life of the project of a broadened tax base would include road improvements, better school facilities, better hospital facilities, and a general increase in the standard of living for residents of the watershed and surrounding area.

Secondary effects induced by and stemming from the project will include increased activity in the transportation sector; increased sales of feed, seed, fertilizer, gas, and oil; increased sales of groceries and recreational supplies; and increased activity in the service sector--hotel, motel, and restaurant.

The reservoir and associated recreational facilities (371.5 acres) will provide water-based recreational opportunities for the residents and employees of the Boulder River School and Hospital. City and county associations for retarded persons will utilize the reservoir and recreational facilities. Residents of the watershed and Boulder will be provided water-based recreation within a reasonable distance.

Quality of living for the ranchers in the valley, persons in Boulder, and other beneficiaries is expected to be improved.

An old stage station site will be destroyed during excavation for the foundation of the proposed dam on the Little Boulder River. See discussion pertaining to this site on page E-9.

Favorable Environmental Impacts

- (1) reduced erosion and sedimentation rates in watershed;
- (2) the creation of border vegetation for game and nongame wildlife on benchlands;

- (3) the shift of 2,800 acres of Class IV, V, and VI irrigated hayland to pasturelands;
- (4) the shift of 5,700 acres of Class II and III dry cropland and 500 acres of Class II and III range to irrigated alfalfa hay and small grain;
- (5) a reduction of high water table conditions on bottomlands;
- (6) a reduction of mosquito problems caused by overland flow conditions on bottomlands;
- (7) increased streamflows in 30 miles of the Boulder River during the irrigation season;
- (8) the recovery of about 200 acres of land in existing irrigation distribution systems;
- (9) a more efficient use of surface waters in the watershed (irrigation efficiencies will be increased from less than 10 percent to 37 percent);
- (10) an increase in fish populations in a 30-mile reach of the Boulder River with a resulting increase in 800 fisherman days per year;
- (11) creation of permanent reservoir pool of 2,700 acre-feet with a water surface of 165 acres and a depth of 40 feet;
- (12) an increase in crop yields in the project area--
 - (a) hay from 2.5 tons per acre to 4.25 tons per acre,
 - (b) pasture from 0.75 ton of hay plus 1 AUM to 6.0 AUM's;
- (13) more green area in the watershed, enhancing the visual landscape;
- (14) larger numbers of livestock which results in an improved economic base and more employment in the project area;
- (15) the maintenance of existing riparian habitat in the bottomlands adjacent to the Boulder River through reduced land clearing;
- (16) the establishment of brushy vegetation on new canals that are constructed on the benchlands;
- (17) the availability of a water supply for wildlife that inhabit the benchlands during the irrigation season;
- (18) the improvement of the fishery and streambank vegetation along reaches of the Boulder River that are presently dewatered each summer;

- (19) improvement of fish habitat by reduced use of 25 diversions that now restrict fish movement and cause disturbance of the channel bottom;
- (20) a reduction of water temperatures in the lower 30 miles of the Boulder River, resulting from return flow water and irrigation water delivery;
- (21) a possible increase in fish production in a 10-mile reach of the Boulder River below the project area;
- (22) the development of recreational facilities around the reservoir which will provide about 35,130 visitor days of general recreational use and 8,340 fisherman visits annually;
- (23) the creation of a resting area for waterfowl in the reservoir;
- (24) the creation of a clear water reservoir (350 acres when full) that will be a scenic resource;
- (25) an increase in permanent employment opportunities of 11.9 man-years of annual employment;
- (26) an increase in employment opportunities of 99 man-years during the construction period;
- (27) an increased tax base in the watershed through an increase in property values;
- (28) an increase of opportunities for the use of electrical equipment and efficient use of electrical energy; and
- (29) an increased quality in the standard of living due to an improved economic base.

Adverse Environmental Impacts

- (1) a commitment of 380 acres of land for the dam and reservoir, including:
 - (a) 47.3 acres of bottomland (pasture and hayland),
 - (b) 60.6 acres of riparian vegetation which gets incidental winter use by elk and mule deer,
 - (c) 174.2 acres of rangeland, and
 - (d) 97.9 acres of placer mine spoils;

- (2) the use of 370.0 acres of land, including 210 acres of rangeland and 160.0 acres of cropland for irrigation canals and right-of-way;
- (3) the inundation of 3.6 miles of stream fishery and streambank vegetation on the Little Boulder River (loss of 540 fisherman days annually);
- (4) the reduction of Little Boulder River flows below the reservoir (1.6 miles) to 1 cfs except during the irrigation season when flows will be about 10 cfs (loss of 240 fisherman days annually);
- (5) blockage of ground-water recharge to the Little Boulder River below the dam;
- (6) blockage of fish movement on the Little Boulder River;
- (7) larger numbers of livestock which will increase the pressure on riparian habitat that is within livestock use areas;
- (8) some disturbance of wildlife on the benchlands when irrigation canals are constructed and rehabilitated;
- (9) the loss of brushy vegetation along the abandoned canals;
- (10) a commitment of about 11.0 acres of forested land for road construction along the north side of the reservoir;
- (11) the construction of about 2.7 miles of powerline which will cause minor disturbance of soil and range cover during construction (about 8.0 acres of forest will be cleared);
- (12) the relocation of the Boulder River School and Hospital day camp
- (13) the development of private lands adjacent to the recreational area (the result would be an increase in potential pollution problems, increased traffic, and additional pressure on wildlife populations);
- (14) changed appearance of lower portions of the Little Boulder River Watershed;
- (15) the exposure of minor slump areas and nonvegetated shorelines when the irrigation storage is removed from the reservoir;
- (16) smoke, noise, dust, and sediment pollution during construction;
- (17) the creation of barren borrow areas above the high water line on the northern shore of the reservoir until vegetation becomes established;

- (18) an increase in noise, dust, and traffic as a result of the recreational development;
- (19) the relocation of three families (10 persons), including one farm business;
- (20) an old stage station site (evidence of old foundation and walkway) will be destroyed during project construction; and
- (21) the relocation of the Boulder River School and Hospital day camp.

ALTERNATIVES

No Project

With no project, present trends in land and water resource use would continue. Unbalanced ranching operations would continue, causing trucking of livestock and hay. Existing land-clearing rates would result in the removal of 200 acres of riparian vegetation along the Boulder River and 30 acres of riparian vegetation along the Little Boulder River. The Boulder River fish population would continue to be depressed due to continuing irrigation diversions and the presence of heavy metals in the water. Recreational development in the watershed would be limited.

Net monetary average annual benefits of \$125,200 will be foregone if the project is not built.

Accelerated Land Treatment Alone

The accelerated land treatment alternative would consist of conservation land treatment on all the lands in the watershed. Other than improving the presently irrigated land along the Boulder River, this alternative would not be significantly different from the "no project" alternative. About 1,000 acres of dry cropland would be expected to be converted to irrigated cropland.

Conservation land treatment on the irrigated land would include: conservation cropping systems, irrigation system reorganizations, residue management, water control structures, drainage system, pasture and hayland management, a limited number of sprinkler irrigation systems, and planned grazing systems.

Production on hayland after the land treatment application would be expected to increase from 2.25 tons per acre to 2.75 tons per acre. Production on dry cropland, which would be converted to irrigated land, would be expected to increase from 32.5 bushels of grain per acre to 2.75 tons of hay per acre. Grazing would be expected to increase from 0.75 AUM's to 1.0 AUM's per acre. The additional production of hay and pasture with the land treatment alternative would not be sufficient to correct the unbalanced feed and forage base. Trucking of livestock out of and hay into the watershed would continue.

Increased irrigation diversion efficiencies and the expanded irrigated area would dry up eight miles of the Boulder River in addition to the existing 12 miles of dry stream.

Land clearing rates, although slower than with no project, would be expected to result in the removal of 150 acres of riparian vegetation along the Boulder River and 30 acres of riparian vegetation along the Little Boulder River.

The cost of the land treatment alternative would be \$452,000.

Single Purpose Irrigation Reservoir With Land Treatment

A single purpose irrigation reservoir could be built at the same site as the proposed multipurpose reservoir. The reservoir would have a capacity of 12,300 acre-feet. The 100-year sediment storage would require 300 acre-feet. The remaining 12,000 acre-feet would be used as irrigation storage for 10,700 acres.

The dam, spillway system, and reservoir basin would require 87 acres of public lands and 441 acres of private land. Canal rights-of-way would require 370 acres of land. Construction of the dam, spillway, and irrigation delivery systems would eliminate 50 acres of riparian vegetation along the Little Boulder River and the Boulder River.

Construction of the single purpose irrigation reservoir would inundate 3.5 miles of the Little Boulder River and dewater to one cfs an additional 1.6 miles of the stream below the structure. Effects of this alternative on fish and wildlife below the reservoir would be the same as those of the planned project. However, no recreational water or facilities would be provided.

Agriculture land uses and production rates with this alternative would be the same as those with the planned project.

The single purpose irrigation reservoir alternative would cause the relocations of three families, construction of 2.7 miles of powerline, and 3.4 miles of road as discussed under the planned project.

The cost of this alternative would be \$8,400,000.

Multipurpose Reservoir For Irrigation, Recreation, and Fish and Wildlife With Land Treatment

This alternative is discussed in the planned project section of this statement.

Multipurpose Reservoir For Irrigation, Recreation, and Fish and Wildlife With Land Treatment (Alternative No. 1)

A multipurpose reservoir similar in size to the planned project, but including storage to augment low flows in the Boulder River, was

first considered in the planning process. The reservoir would contain 2,300 acre-feet of fish and wildlife water and 9,700 acre-feet of irrigation water along with 2,700 acre-feet of permanent recreational storage and 300 acre-feet for sediment. In addition, this alternative would have included acquisition and improvement of fishing access points and obtaining foot easements for fishermen along about 34 miles of the Boulder River. With the conditions set out by the Montana Department of Fish and Game, agreement could not be reached with the sponsors for this alternative.

Many of the impacts for this alternative would be similar to the planned project. A summary of significant differences is provided below:

1. Less land would be irrigated in the valley. Supplemental irrigation water would be provided for 9,200 acres along the Boulder River, thereby giving these acres a full irrigation supply.
2. The 2,300 acre-feet would provide a flow of 10 cfs for 115 days in the Boulder River for fish and wildlife during the summer when portions of the river are dewatered.
3. Fish production could be expected to increase from 10 pounds per surface acre to 25 pounds per surface acre standing crop.
4. Fisherman use on the Boulder River would be expected to increase from 100 to 200 fisherman days per mile annually for 30 miles (4).
5. Fisherman use of the 10-mile reach of the Boulder River below the project could be expected to increase.
6. Irrigation return flows would supplement the 10 cfs base flow and, when combined with irrigation releases, would provide 30 to 35 cfs during August for reaches of stream presently dewatered.
7. The total reservoir cost would be similar to the planned project; however, fish and wildlife costs would amount to about \$830,000. Total project cost is estimated at \$9,600,000, including land treatment.

SHORT-TERM VERSUS LONG-TERM USE OF RESOURCES

Long-term projections of natural resource use in the watershed indicate a continuing livestock ranching economy. The project provides for protection and conservation of land and water resources which will allow sustained livestock and agricultural use.

The project will help reduce immediate problems of unreliable irrigation water supplies, drainage, and erosion. The increased water supplies will help provide the stimulus for long-range planning by watershed residents concerning wise use of the resources of the area.

The planned systems of conservation land treatment and structural measures will do much to solve both short-term and long-term problems in the watershed. Land treatment measures will permit continued use of the land to serve the present generation while preserving it for use by future generations. Application of improved management practices and treatments under the land treatment program on rangeland, cropland, and hayland will enable watershed ranchers to achieve a more favorable income balance from their various land use commitments.

Following project installation, ranchers will be able to make more efficient use of the land and water resources. The project will permit future land use choices that are now unavailable. Ranchers will have a wider selection of crops and cropping patterns from which to choose.

Stored irrigation water could be available for a change in use if purchased at a later date for augmentation of low flows, thereby improving fish and wildlife resources for use by future generations. After the design life of 100 years, the project will continue to improve the environment of the area and conserve land and water resources.

Development and maintenance of the recreational use area will be a long-term effect of the project.

This watershed project is located in Water Resources Region 10, Subregion 02. There are applications for assistance on six potential PL-566 projects in this area, including the Boulder River project. Of these projects, none have been constructed and none are under construction.

This project is not being considered jointly with any other project. The project has been identified as one of the principal water control features in the 1980 Framework Plan shown in the June 1969 Type I Comprehensive Framework Study for the Missouri River Basin.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Installation of the project will commit about 380 acres of land to use as a dam, reservoir, and emergency spillway. Land use is presently: 47.3 acres of pastureland and hayland; 60.6 acres of riparian vegetation; 174.2 acres of rangeland; and 97.9 acres of disturbed land that have been hydraulically mined.

Installation of the canals and appurtenances will use about 370 acres of land for canal right-of-way. Present land use is: 210 acres of rangeland and 160 acres of cropland. A total of 220 acres will be committed to canals and access roads.

The project will commit 85 man-years of skilled labor; 14 man-years of semi-skilled labor; and \$9,556,840 for construction and cost of implementing the action.

Installation of the project will not preclude use or limit presently available alternative uses of any land or resource in the watershed other than land in the dam, reservoir, emergency spillway, and canals and appurtenances.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

Efforts to develop a plan for irrigation, recreation, and fish and wildlife began in February 1961 when local sponsors submitted an application to the Secretary of Agriculture for planning assistance under authority of PL-566. The application was approved by the State Soil Conservation Committee in April 1961. Preliminary investigations were conducted to estimate the physical and economic feasibility of pursuing solutions to the problems outlined in the watershed application. A preliminary investigation report, published in March 1963, indicated project feasibility. Authorization for planning was received in June 1963. Land rights problems held up planning until 1972. The sponsors formed a legal organization, known as the North Boulder Drainage District, in March 1973 to plan and carry out this project.

Concerned agencies, groups, and individuals were notified May 1973 that project planning was being resumed. Inputs were requested from all sources with expertise in developing a plan for the total resources of the watershed. Opportunities were provided early in planning stages for recommendations and evaluations of various alternative proposals. Numerous meetings involving the public, sponsors, and concerned agencies were held to discuss details of alternative plans. Public involvement will be continued through the use of public meetings and opportunities to comment during the review process.

Much time was spent during planning discussing alternative plans with local groups, sponsors, and representatives of state and federal agencies. It was suggested early in planning that the project be developed, if possible, for three purposes: irrigation, recreation, and fish and wildlife. In particular, requests were made to provide storage for augmenting low flows in the Boulder River. These discussions of alternatives contained displays of effects and costs. Through the analysis of a number of alternatives, it was determined that the greatest benefits could be achieved through joint use of water for irrigation, recreation, and fish and wildlife purposes. Fish and wildlife benefits in the Boulder River will be provided by dual use of water stored for irrigation and fish and wildlife and irrigation return flows.

The U. S. Fish and Wildlife Service, in cooperation with the Montana Department of Fish and Game, assisted in field evaluations and gathering field data and made recommendations for enhancing fish and wildlife resources.

The U. S. Fish and Wildlife Service recommended the following items be considered in the development of the project: (1) operation and maintenance agreements include provision for the installation of a weir at the upper end of the reservoir in the event it becomes necessary to control rough fish; (2) efforts should be made to preserve streambank vegetation downstream from the reservoir; (3) spoilbanks, dikes, and cuts should be reseeded with adapted grasses; (4) a zoning plan for the reservoir should be developed for the most equitable use by recreationists; (5) individual landowners in the watershed should be informed of opportunities available through going agricultural programs whereby land treatment practices which are beneficial to fish and wildlife can be cost-shared by the federal government; and (6) minimum flows be maintained in the Boulder River.

Assistance was provided by the Montana Department of Fish and Game in the development of basic stream inventory data and making evaluations and recommendations for development of this plan.

Assistance was also provided by the Recreation and Parks Division of the Montana Department of Fish and Game in developing a recreation proposal for the multipurpose reservoir.

Assistance was provided by the U. S. Forest Service for the development of hydrologic data in the upper watershed and in the development of a land treatment plan for forested areas in the watershed.

The Montana Statewide Archeological Survey was asked to survey the dam and reservoir area early during planning to identify any archeological or historical resources. The significance of an old stage station site, which had previously been identified by the Montana Historic Preservation Officer, was assessed through on-site surveys and archival research. The Montana State Historic Preservation Officer declined to render an opinion on eligibility of the cultural resources found at the old stage site for inclusion in the National Register of Historic Places. A request was submitted to the Secretary of the Interior through his designated representative, the Office of Archeology and Historic Preservation, National Park Service, Washington, D. C. Further archeological testing of this site has been recommended. Following testing, the Secretary of the Interior will be requested to undertake the recovery of these resources which would be affected by the proposed project if, in his opinion, such actions are necessary. Any recovery operations will be performed in accordance with Public Law 93-291. SCS has complied with Section 106 of the National Historic Preservation Act (PL-89-665) and Executive Order 11593.

A summary of water quality data and pollution problems affecting the Boulder River was provided by the Montana Water Quality Bureau.

A preliminary draft watershed plan and environmental impact statement were distributed for review and comment to concerned individuals and agencies in January 1975. The draft watershed plan and draft environmental impact statement were reviewed at a public meeting, January 8, 1976, at Boulder, Montana. Copies of both documents were mailed in advance to interested and concerned individuals and representatives of state and federal agencies with an announcement of the public meeting and an invitation to comment. Notices of the public meeting were published in the Boulder Monitor and by other news media. There were 62 persons who attended the public meeting. Oral and written comments were invited from all persons at this meeting.

The draft environmental impact statement was transmitted to the Council on Environmental Quality on January 9, 1976. Notice of availability of copies of this statement was carried in the Federal Register on January 30 and February 3, 1976, and by the Boulder Monitor on January 22, 1976. Interested persons or groups were asked to comment on the draft environmental impact statement within 60 days.

An interagency review was conducted in which copies of the draft environmental impact statement and watershed work plan were distributed to concerned federal and state agencies and others on January 9, 1976. The views and comments of these agencies and others are summarized below. Written comments received are shown in Appendix C.

Discussion and Disposition of Each Comment on the Draft Environmental
Impact Statement and Related Comments on the Watershed Work Plan

Agencies Specifically Asked to Comment

Governor of Montana	Advisory Council on Historic Preservation
Department of the Army	Department of Health, Education and Welfare
Department of Commerce	Environmental Impact Assessment Project
Federal Power Commission	Environmental Defense Fund
Trout Unlimited	Office of Equal Opportunity-USDA
National Audubon Society	National Wildlife Federation
Burlington Northern Inc.	Environmental Protection Agency
Montana Clearinghouse	Department of the Interior
Friends of the Earth	National Resources Defense Council
League of Women Voters	Department of Transportation

Information copies of the draft EIS were also sent to the following agencies, groups, or individuals:

Montana Dept. of Natural Resources and Conservation
Department of Housing and Urban Development (Denver Region)
U. S. Fish and Wildlife Service (Billings Area Office)
Montana Department of Intergovernmental Relations
Montana Department of State Lands
Dept. of Anthropology--University of Montana
Agricultural Research Service, Sidney, Montana
Farmers Home Administration--Montana State Director
Missouri River Basin Commission--Chairman
Montana Department of Fish and Game
Bureau of Land Management--Montana State Director
National Park Service, Midwest Archeological Center
Cooperative Extension Service--Montana Director
Montana Department of Highways
Montana Dept. of Health and Environmental Sciences
Omaha District Corps of Engineers
Bureau of Reclamation--Upper Missouri Region
Montana Bureau of Mines and Geology
Agricultural Stabilization and Conservation Service
Montana Association of Conservation Districts
Bureau of Outdoor Recreation--Mid-Continent Region
Dr. Phillip Pallister--Boulder, Montana
Environment and Ecology, Inc.--Billings, Montana
Montana Water Quality Bureau
Montana Fish and Game Commission
Montana State Historic Preservation Officer
Montana Water Development Association
Boulder Chamber of Commerce
Montana Power Company
Montana Resource Development Bureau
Montana Department of Institutions
Sierra Club, Townsend, Montana
Prickly Pear Sportsmens Association
Missouri River Basin Commission--USDA Representative
Montana Audubon Society

Montana Wildlife Federation
Skyline Sportsmen
Mayor, City of Boulder
Jefferson County Commissioners
Bob Ryan, Attorney, Billings, Montana
Superintendent, Boulder River School and Hospital
U. S. Geological Survey
Montana Environmental Quality Council
John A. Stanturf, Cornell University, New York, NY
R. T. Heiderstadt, Tippetts-Abbett-McCarthy-Stratton, New York, NY
Brian P. Borofka, Environmental Science & Engineering Inc., St. Louis, MO
M. Rupert Cutler, Michigan State University, East Lansing, MI
N. Parsons, Basin, MT
Idaho State University, ID
Richard B. Hardesty, Sr., Town of Laurel, Laurel, Delaware
Thomas Kotynski, Tribune Capitol Bureau, Helena, Montana
C. Jon Stone, Cardwell, Montana
Allan Trovillion, Southwest Research Institute, San Antonio, Texas
Ryckman, Edgerley, Tomlinson and Associates, St. Louis, Missouri
Black and Veatch, Kansas City, Missouri
H. Paul Friesema, Northwestern University, Evanston, Illinois

Agencies and Individuals From Which Comments Have Been Received

Governor of Montana
Department of the Army
Environmental Protection Agency
Department of Health, Education and Welfare
Montana Department of Fish and Game
Ron Holliday, Montana State Historic Preservation Officer
Montana Bureau of Mines and Geology
Montana Department of Health and Environmental Sciences
Department of Housing and Urban Development
Robert P. Ryan
Bruce Gilmer
Barbara Shink
Advisory Council on Historic Preservation
Department of the Interior

1. Governor of Montana

a. Comment:

"I am, therefore, pleased to give my endorsement to the draft work plan and draft environmental impact statement for the Boulder River Watershed as submitted."

Response:

Noted.

2. Department of the Army

a. Comment:

"We have reviewed this work plan and foresee no conflict with

any projects or current proposals of this Department. The draft environmental statement satisfies the requirements of Public Law 91-190, 91st Congress, insofar as this Department is concerned.

Response:

Noted.

b. Comment:

"The Montana State Conservationist should be informed that regulatory permits will be required for work that affects navigable waters and requests for such permits should be made to the Omaha District Office of the Corps of Engineers at the earliest possible date."

Response:

The State Conservationist and the project sponsors are informed of the permit requirements and will contact the Omaha District Office for assistance.

3. Environmental Protection Agency

Comment:

"Thank you for the opportunity to review the draft environmental impact statement for the Boulder River Watershed, Jefferson County, Montana. If the mitigation measures outlined on this document are followed, the project described should be environmentally acceptable and should not cause the violation of environmental standards.

"According to EPA's rating system for draft environmental impact statements, this project has been rated LO-1 (lack-of-objections - sufficient information). Again, EPA has made this rating based on the assumption that the mitigative measures (erosion control, wildlife protection, etc.) will be a basic part of the project. If you have any questions, please contact my office."

Response:

Noted.

4. Department of Health, Education and Welfare

Comment:

"It appears to me that the impacts expected to result from the proposed project and reasonable alternatives thereto have been adequately addressed."

Response:

Noted.

5. Montana Department of Fish and Game

a. Comment:

"During your earlier planning efforts, the Department of Fish and Game was requested to financially support the Boulder River Watershed project. Our Commission supported Alternative No. 1 of your Service's Boulder River Watershed Project and agreed, subject to availability of funds and legislative appropriation, to fund the nonfederal fish and wildlife portion of the project's cost, provided the following conditions could be met during the remainder of the planning process."

Response:

Several alternatives were examined under the general alternative, "Multipurpose Reservoir for Irrigation, Recreation, and Fish and Wildlife With Land Treatment," discussed on page II-67 of the draft EIS. Alternative No. 1 proposed a reservoir with the following storage allocations: irrigation, 9700 acre-feet; fish and wildlife, 2300 acre-feet; recreation, 2700 acre-feet; and sediment, 300 acre-feet. The concept of providing water for fish and wildlife in the Boulder River was strongly supported by representatives of the U. S. Fish and Wildlife Service and Montana Department of Fish and Game during early stages of planning. Alternative No. 1 was presented to the Montana Fish and Game Commission. With the conditions set out at that time, agreement could not be reached with the Sponsors for this alternative. Some of the conditions were outside the scope of this project or pertained to matters for which answers to questions could not be guaranteed. The plan was later reformulated to the present proposal.

b. Comment (summarized):

Condition No. 1. "We believe your fisherman use projections are quite speculative."

Response:

These use projections were developed jointly by biologists from the Fish and Wildlife Service, Montana Department of Fish and Game, and Soil Conservation Service.

c. Comment (summarized):

Condition No. 1. "It is recommended information from ongoing studies of water quality and fisheries be used in the planning process."

Response:

Current information was considered in this plan. Additional information will be considered in the final operations agreements.

d. Comment (summarized):

Condition No. 2. "We disagree that sediment is localized to a 2-3 mile segment of the Boulder River.

Response:

The problem occurs primarily in a 2-3 mile segment; however, it was not intended to confine the problem to this segment.

e. Comment (summarized):

"Table 1A indicates no measures are planned to minimize sedimentation from high intensity storms. Further that this sediment source is a serious problem exerting checks on fisheries potential."

Response:

Table 1A is a status of land treatment already applied. Land treatment measures as outlined on pages II-5 and II-6 will reduce erosion and sedimentation. Sediment source areas will be given priority consideration.

f. Comment (summarized):

Condition 3. "There should be some guaranteed public benefits."

Response:

Public benefits from the project will include:

1. Fishing on the reservoir and irrigation outlet (8340 fisherman days annually) which will accrue to local residents and others.
2. Recreation in the form of boating, hiking, picnicking, nature walks, and other associated outdoor activities (35,130 visitor days annually) will accrue to residents in the community, Boulder River School and Hospital, and others.
3. Increased trout spawning, feeding, and resting areas in the Boulder River.
4. Increased resting area for migrating waterfowl.
5. Increased sales of consumer products due to increased agricultural production, recreation, and fish and wildlife use.

6. Increased sale of feed, seed, fuel, fertilizer, etc.
7. Increased employment opportunities in an Economic Development Administration Title 4 county where depressed economic conditions prevail.
8. Increased tax base in Jefferson County.

g. Comment (summarized):

"There should be guaranteed fisherman access in order to claim public fishery benefits."

Response:

Biologists of the Fish and Wildlife Service, Montana Department of Fish and Game, and Soil Conservation Service jointly agreed that increased water would benefit the fishery resource. The improved resource is expected to result in greater fish populations. The increased fish populations will give rise to a potential increase in fisherman-day use. The Boulder River has generally been open to fisherman access throughout the project area. There has been good cooperation between ranchers and sportsmen. This condition was projected to prevail with the proposed project. Formal public access easements are not a part of this plan and reference to lack of guaranteed access was deleted. No monetary benefits were claimed as a result of the potential increase in fisherman-day use on the Boulder River. Public access will be provided around the multipurpose reservoir.

h. Comment (summarized):

Condition 4. "With the projected reduction in riparian vegetation, fish population increases are questionable."

Response:

Fish population projections were made jointly by biologists from Montana Department of Fish and Game, U. S. Fish and Wildlife Service, and SCS. Projections were based on conditions expected with the project and advice from skilled vegetative specialists.

i. Comment (summarized):

Condition 4. "Benefits to wildlife on 54,000 acres from an expenditure of \$1620, as shown in Table 1A, are questioned."

Response:

Table 1A lists land treatment practices and dollar values for those practices already applied and does not pertain to planned land treatment. Planned practices that include the bottom lands and streambanks are discussed on pages II-4 to II-6 of the draft EIS. Impacts of these practices are discussed on pages II-48 and II-49.

j. Comment (summarized):

Condition 4. "Streambank stability is important for a better fisheries resource and will require less expensive flood control measures."

Response:

Noted.

k. Comment (summarized):

Condition 4. "Data gathered below dewatered areas, where seep return flows were evident, showed extremely high temperatures. This temperature problem is compounded by lack of streambank vegetation."

Response:

The extremely high temperatures noted are more closely related to the extreme dewatered condition of the Boulder River than to lack of streambank vegetation or return flows. Increased flows from irrigation-fish and wildlife releases and irrigation return flows will provide continuous flow in the river. Temperatures will be reduced.

l. Comment (summarized):

Condition 5. "Figure 6 shows about 21 cfs bypassing the diversion; however, the plan states a minimum of 12 cfs will bypass the diversion."

Response:

The 21 cfs shown in Figure 6 is an average for the month of August. Figure 6 has been changed to reflect this condition.

m. Comment:

Condition 5. "There is no indication how water rights will be addressed with this project. Would a state agency be reserving the minimum flow of 12 cfs? This is essential if your fisheries benefit projections are to be used."

Response:

Necessary water rights as required by State law will be obtained by the project sponsors. No water right would be required to guarantee flows past the main irrigation diversion structure. Irrigation water will be passed through the main diversion for irrigation delivery 12 river miles downstream and between 17 and 24 miles downstream. At these diversion points return flows will

have more than replaced the irrigation water. See Figure 6 for a projected average condition during August.

n. Comment (summarized):

"We favor trading 80 acres of state land to be acquired for the reservoir and adjacent recreational area for access areas along the Boulder River."

Response:

Continued public use will be made of the state lands acquired for the dam, reservoir, and recreational facilities area. Part of the planned recreational facilities will be located on the State land. The method used for land rights acquisition (purchase or easement) is dependent upon negotiations between landowner and the sponsors.

o. Comment:

"To assure adequate streamflows can be maintained we recommend either dual outlet funnels be installed so that releases can continue during repair periods or that a minimum flow from the main Boulder River be retained in the channel during periods when releases from the dam are curtailed."

Response:

Flow conditions on the Boulder River during emergency repair periods will be determined by water rights agreements. Extensive repairs and complete closure of the conduits are highly unlikely during the critical summer period.

p. Comment (summarized):

"Reservoirs delay rather than reduce downstream sediment."

Response:

Records of reservoir sedimentation do not support this opinion.

q. Comment:

"On page II-59, favorable environmental impacts Nos. 8 and 13 are not guaranteed by the project and it is questionable that they will occur."

Response:

The ranchers' need to clear bottom land for hay production will be reduced. Lower water temperatures in 30 miles of the Boulder River will result from increased flows.

r. Comment:

"On page II-41, you imply that flooding of the lowlands adjacent to the Boulder River is damaging. Periodic inundation of floodplains is a natural process that maintains the high fertility of these areas. To label this process as a "damage" that should be eliminated represents a very short term view of the basic function of rivers and their floodplains."

Response:

Where analysis has been made of nutrient levels and organic matter in newly deposited sediment, the data show that the fresh sediment does not generally add to the fertility of the soil.

s. Comment:

"We believe your predicted 35,150 annual visitor days use of this project is high and question that this great a need presently exists in the area. A project benefit of this magnitude should be based on a study of recreational needs in the area."

Response:

Projected annual visitor day use figures were developed considering population and transportation facilities serving the area. This figure also considers special use made by residents and visitors of the Boulder River School and Hospital.

t. Comment:

"Recreational facilities construction costs are extremely underestimated as shown in this statement. They do not reflect costs of these facilities if they are installed through the normal contracting processes and they reflect out of date unit prices."

Response:

Recreational facilities construction costs have been revised, including the unit prices. See Table 2B.

u. Comment:

"Under separate cover, Ron Holliday, Administrator of our Recreation and Parks Division (also functions as the State Historic Preservation Officer), has given you his views concerning the Old Boulder Stage Station Site. These comments should be considered a part of our total Department response to this statement."

Response:

See comment below.

6. Ron Holliday, Montana State Historic Preservation Officer

a. Comment:

"I would like to see the results of a salvage excavation before rendering any opinion on the eligibility of the site in question." [Eligibility refers to eligibility for inclusion on the National Register of Historic Places.]

Response:

Since the State Historic Preservation Officer declined to rule on eligibility for inclusion on the National Register of Historic Places without a salvage excavation, a request was submitted to the Secretary of the Interior through his designated representative, the Office of Archeology and Historic Preservation, National Park Service, Washington, D. C. The Secretary of the Interior will be requested to undertake the recovery of these resources which would be affected by the proposed project if, in his opinion, such actions are necessary. The EIS has been changed to reflect the current situation.

7. Montana Bureau of Mines and Geology

a. Comment:

"It is estimated, in the EIS, that the project will improve fish production in the Boulder River, 'resulting in an increase of 800 fisherman days per year on the lower 30 miles of the river'. Because fishing access along this 30-mile reach is not guaranteed, will these '800 fishermen' be primarily landowners?"

Response:

See discussion of Montana Department of Fish and Game--comment "g".

b. Comment:

"Increasing efficiency of present irrigation from 10% to 37% will reduce return flows, but might the addition of 3,400 acres of new irrigation (even at 37% efficiency) result in an increase in return flows?"

Response:

The net effect of this project will be an increase in the return flows that stay in the Boulder River. A comparison of return

flows using only efficiencies and area irrigated cannot be made. A comparison of return flows present to projected must include the existing redirection of return flows and the proposed storage for late season releases.

c. Comment:

"If existing rights total 500 cfs, any increases in return flow might be picked up by people holding these rights. Therefore, the effect of the project on return flows is difficult to determine from data presented in the EIS."

Response:

Reapportioning of water rights will occur with installation of the project. The effect of the project on the return flow regime is projected in Figure 6.

d. Comment:

"Is a figure of 37% (for expected irrigation efficiency of the project) realistic?"

Response:

Yes.

e. Comment:

"Will the application of much larger quantities of irrigation water (even at greater efficiency) actually result in 'reduction of high water table conditions on bottomlands'? Can we not expect to lose land on the bottom while we are gaining it on the bench?"

Response:

Present high water table conditions on the bottomlands are aggravated by extreme overirrigation during periods of high flow in an attempt to offset late season irrigation water shortages. Improved water management with the project will reduce or eliminate this practice, thereby reducing high ground water conditions.

8. Montana Department of Health and Environmental Sciences

a. Comment:

"As generally discussed in the plan, we agree with the concern expressed for potential erosion problems due to increased cattle

usage of riparian vegetation and an increase in the number of irrigation return flows."

Response:

A discussion of the net effect of increased livestock numbers on riparian vegetation is found on pages II-50 and II-51 of the draft EIS. The return flows are not expected to cause an erosion problem because overbank return flows will be reduced and return flows with the project will be primarily subsurface.

b. Comment (summarized):

"Will the increased availability of increased irrigation water accelerate clearing of riparian vegetation?"

Response:

The project will make more water available to bench lands, thereby reducing the need to clear riparian vegetation.

c. Comment (summarized):

"Discussion should be added to include Hauser and Holter Lakes, Lake Helena, Park Lake and Silver Lake."

Response:

Discussion has been added to include these flatwater resources.

9. Department of Housing and Urban Development

a. Comment:

"As you may know, this Department's main areas of concern in responding to Draft EIS's are; (1) the consistency of an action with the comprehensive planning for the area; and (2) the action's impact on housing, particularly in an urban environment. Our review indicates that the proposed action will not require further comment in the HUD areas of jurisdiction assigned by the CEQ."

Response:

Noted.

10. Robert P. Ryan, Attorney, Billings, Montana

a. Comment (summarized):

"The amounts estimated for land acquisition should be made current."

Response:

Land rights costs have been revised to reflect current values.

11. Bruce Gilmer, Boulder, Montana

a. Comment (summarized):

"I am protesting, as a taxpayer, the expenditure of 3.6 million dollars of public funds and the taxpayers are gaining little in return."

Response:

The project has been planned to make maximum multipurpose use of resources. Widespread public benefits will accrue, including additional recreational opportunities for people in the Boulder community. The plan will alleviate the problem of summer dewatering of the Boulder River. The project has a favorable benefit-to-cost ratio.

b. Comment (summarized):

"Direct access to the Little Boulder drainage will be lost and travel time into the drainage will be increased."

Response:

The plan has been revised to provide access to the Little Boulder drainage adjacent to the present road above the reservoir high water line. Travel time to the Little Boulder drainage will not be increased.

c. Comment:

"The sportsman will also lose access to the West Creek area that is southwest of the dam. There are now two jeep roads going into the area that will be either flooded or cut off."

Response:

Access to West Creek will still be available through Beaver Creek via the Whitetail Road.

d. Comment (summarized):

"The 1.6 miles of stream below the dam as well as the area occupied by the dam and reservoir will be lost to the taxpayer and sportsman."

Response:

An assessment of the gains and losses to fishermen in this reach of the Little Boulder River has been made jointly by biologists of the Montana Department of Fish and Game, Fish and Wildlife Service, and Soil Conservation Service. As discussed on pages II-49 and II-50 of the draft EIS, there will be an expected gain of 8,340 fisherman days and an expected loss of 780 fisherman days (net gain of 7,560 fisherman days annually).

e. Comment (summarized):

The sponsors plan to charge a fee for fishing, boating, and picnicking.

Response:

The portion of nonfederal funds for recreational resource development may come from several sources, including the State of Montana, sportsmen's groups, the project sponsors, etc. User fees are optional, but could be used only to repay nonfederal capital costs and operation and maintenance costs. Although provision is made for the sponsors to charge fees to recover these costs, user fees will be contingent upon the final financial arrangements yet to be made.

f. Comment:

"All but two ranches in the irrigation project have posted signs from NO TRESPASSING WITHOUT PERMISSION to KEEP OUT."

Response:

The project sponsors report that in recent years it has become necessary to post their land in many areas to protect their property from trespassers. They report that cattle have been shot; there is litter; and disturbance of livestock with firecrackers. The ranchers have found it necessary to know who was on their property.

The ranchers have been very cooperative with fishermen who ask permission to fish.

g. Comment:

". . .I fear that when the benchland of the Boulder Valley becomes irrigated land, this land will also become posted. This would deny sportsman access to Bull Mountain, Dry Creek, and Sage Brush Park areas."

Response:

It would appear that future access to these lands is primarily contingent upon the relations sportsmen maintain with the ranchers.

h. Comment (summarized):

"Each year ranchers dam off and dewater the river. The use of present diversions will not be eliminated."

Response:

The need to use many of the diversions will be eliminated by construction of the new canal system. This will also eliminate the need to dewater certain reaches of the Boulder River during the irrigation season.

i. Comment:

"There is no guarantee of fisherman access to the stream even after the taxpayers finance the dam."

Response:

Continued fisherman access to the Boulder River is contingent upon sportsman-landowner relations.

j. Comment (summarized):

"Ranchers have done little to improve existing irrigation systems or use all existing irrigable land."

Response:

Investments to improve existing systems and to irrigate more lands

are contingent upon a dependable and adequate water supply. Some ranchers are presently investing in sprinkler systems.

k. Comment:

"There is also the possibility of drilling wells that has not been tried in the area."

Response:

Irrigation wells are not a practical means of providing the needed water throughout the Boulder Valley. Only a limited number of wells could be developed which would serve small areas. Extensive pumping would dewater the Boulder River Valley and have severe adverse environmental impacts.

l. Comment:

"Somehow it should be solved how to maintain the picnic areas and boat ramps without added expense to the taxpayer."

Response:

Although it is common for user fees to be charged at developed campgrounds on public land, it has not been determined whether user fees will be charged for this facility. See also discussion under comment "e" above.

m. Comment (summarized):

"There should be a provision that would allow for the level of the recreation pool to be raised as the dam fills with sediment or if the quality of the recreation promised is not met."

Response:

Storage has been provided for the 100-year sediment accumulation (300 acre-feet) in addition to a permanent pool for recreation (2700 acre-feet). Normal operations will not permit the reservoir to be drawn down below the elevation of the permanent pool (40 feet deep and 165 surface acres). The average summer pool will be 278 surface acres and 70.5 feet deep. Before irrigation water is withdrawn, the full reservoir will have 350 surface acres and be 89 feet deep. The public will be able to make recreational use of the stored irrigation water through much of the irrigation season. See discussion in the draft EIS, page II-8.

n. Comment:

"There should also be a guarantee that the river would never be completely dewatered again."

Response:

The conditions expected to prevail after installation of the project during the irrigation season are shown in Figure 6.

12. Barbara Shink, Billings, Montana

a. Comment:

"I am protesting the proposed Boulder River Watershed project. I do not feel all the facts have been researched properly or been fairly presented to the people of Jefferson County, especially to the citizens of Boulder."

Response:

Numerous informational meetings, including a public meeting on January 8, 1976, have been held. Public concerns have been recognized and opportunities have been provided for public question and comment. Additional discussion is provided beginning on page II-72 of the draft EIS.

b. Comment:

"It seems to me, that this nine million dollar project that will only benefit fifteen ranchers (taken from an article which appeared in the January issue of the Boulder Monitor) seems a high price to pay; especially when the taxpayers have little or no guarantees. For example, the sportsmen have no guarantee of fishing access to the Boulder River, or for that matter to the Little Boulder. Sportsmen have no guarantee that the Boulder River will not be dried up, as now is the practice of the local farmers. As I understand, the dam will be dropped so many feet during irrigation, but you can't tell me if the farmers need more water, they won't take it!"

Response:

There are 19 ranch units in the benefited area of the watershed. Additional discussion has been added to page II-27 of the draft EIS showing that there are 25 landowners and 33 owner-operators. Regarding fisherman access, stream flows and reservoir storage, reference is made to responses under comments "i", "m", and "n" from Bruce Gilmer and to responses under comments "g" and "n" from Montana Department of Fish and Game.

c. Comment:

"I don't feel enough consideration has been given to the environmental impact this damn will have on the surrounding wildlife. I guess the usual "do it now, and be sorry later" attitude prevails."

Response:

Comment noted.

d. Comment:

"Many people seem to think a recreational playground will be established. I can find too many contradictions to believe this. First, there is a proposed five-horse power limit on all boats; that eliminates all waterskiers. Second, there is mosquito control. During the summer months when the water is low, leaving exposed mud, will this not create a breeding place for even more mosquitoes? Third, since this is a man-made lake, can the fish live and reproduce? If not will the taxpayers again have to pay for the restocking of fish. Forth, with Canyon Reservior and Georgetown Lake so close, with so much to offer, will it be feasible for many sportsmen to come to this proposed damn?"

Response:

The five horsepower limit on boats does eliminate waterskiing; however, on reservoirs of this size, visitor safety and recreational conflicts are important factors. Consideration has been given to all recreationists such that all uses of the reservoir area are compatible. Very little mud will be exposed as the water level of the reservoir is lowered due to irrigation drawdown. The exposed areas will be composed of granitic sands. Secondly, since this is a fluctuating reservoir, very little habitat will be present for mosquito breeding purposes. Fish will live and grow in the reservoir. Reproduction will be limited and restocking, periodically, by the Montana Department of Fish and Game will be necessary, which is commonly done for reservoirs of this type. The proposed reservoir on the Little Boulder River will offer a unique recreational experience. Its size, 350 surface acres, and setting, a small valley surrounded by mountains and timbered slopes, will give the recreationist and sportsman a sense of seclusion. Not only will local residents utilize this facility, but also those persons traveling Interstate 15 with the Boulder interchange three miles north of the reservoir.

e. Comment:

"Why really is this damn being built--for the farmers or the sportsmen? I know that the sportsmen will lose more than they gain and the farmers will be reaping the benefits at the cost of the taxpayers!"

Response:

The dam and reservoir are being planned under a multipurpose concept to provide irrigation water to the Boulder Valley, fish and wildlife water for 30 miles of the Boulder River, and a developed water-based recreational facility. The project will enable more efficient, multiple use to be made of limited water resources.

13. Advisory Council on Historic Preservation

a. Comment (summarized):

"It is unclear whether or not SCS has determined the eligibility of the stage station for inclusion in the National Register of Historic Places pursuant to Executive Order 11593, in accordance with Section 800.4(a)(2) of the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800)."

Response:

In accordance with established procedures, a request was submitted to the State Historic Preservation Officer who declined to render an opinion. Subsequently, a request was submitted to the Secretary of the Interior through his designated representative, the Office of Archeology and Historic Preservation, National Park Service, Washington, D. C. The Secretary of the Interior will be requested to undertake the recovery of these resources which would be affected by the proposed project if, in his opinion, such actions are necessary. The EIS has been changed to reflect the current situation.

14. Department of the Interior

a. Comment:

"Many of our concerns remain unresolved. The DES lacks quantification of measurable impacts and omits the detail necessary to adequately compare alternatives.

"Canal alignments, design, and relevant environmental considerations need greater development and explanation."

Response:

Canal alignment, design, and their environmental considerations would be the same under each alternative except "no project" and "land treatment" alternatives. Environmental impacts of the canal alignment and design have been discussed as a part of the planned project in the EIS. In an effort to avoid repetition,

the alternatives section was prepared to focus on the major differences between the alternatives considered and the planned project alternative.

b. Comment (summarized):

Types and uses of wells on pages I-38 and II-5 (draft plan and EIS) are not explained.

Response:

Land treatment measures outlined in table 1A (page I-38 of draft watershed plan) are those measures that have already been applied. The land treatment measures to be applied (wells and springs) discussed on page II-5 of the draft EIS are livestock water developments to be applied to rangeland.

c. Comment (summarized):

Drainage measures are mentioned, but their impacts on ground water are not evaluated.

Response:

The planned irrigated area in the Boulder valley will not require drainage. Drains for small localized areas on the presently irrigated lands with high water table conditions will be planned as land treatment measures with individual ranchers. Land treatment measures of this type are currently being applied.

The total volume of water that could be developed by installing drainage measures is very small in proportion to flows in the Boulder River. Because of the small volume, these drainage discharges will have no effect on the water levels in the Boulder River or on levels of ground-water recharge.

d. Comment (summarized):

The discussion of BLM actions should be expanded.

Response:

The discussion on pages II-8 and II-8a of the draft EIS was developed in consultation with personnel of the BLM Montana State Office. Details necessary to comply with established regulations will be covered through individual agreements and actions prior to project construction.

e. Comment (summarized):

Land involved in the recreation development areas is available for general recreation use and the development would be a separate action not dependent upon the reservoir application. Subletting under a Recreation and Public Purpose Act lease is not allowed, although the EIS implies sublease or transfer of recreation responsibilities.

Response:

As noted in the draft EIS (page II-8), a right-of-way for 85.6 acres in the recreational area around the reservoir will need to be acquired under the provisions of the 1965 Recreation and Public Purposes Act. The requirements for a lease under this act are to be satisfied.

f. Comment (summarized):

The section on BLM actions discusses an existing mining claim and a portion of the project area which is a known geothermal area. No additional detail is given in the EIS. Mining and geothermal activities should be treated in the description and impacts should be analyzed.

Response:

The existence of a Known Geothermal Resource Area (KGRA) and mining activity are discussed in the Environmental Setting section of the EIS. Implementation of this project will not preclude the development of the KGRA. As a result of the project, mineral resources in the reservoir basin will become more accessible since overburden in these areas will be removed as a part of project construction.

g. Comment (summarized):

It has been our understanding that approximately 21 cfs will bypass the irrigation diversion structure during the irrigation season and a minimum of 12 cfs will be bypassed during low water years.

Response:

The 21 cfs shown in figure 6 is an average for the month of August. Figure 6 has been changed to clarify this. The 12 cfs is the minimum flow expected at the end of the irrigation season during

normal water years. During short water years and years when the reservoir does not completely fill, this minimum flow will be adjusted proportionately to reservoir storage.

h. Comment:

"Paragraph number 5, page II-14. We don't think this release should necessarily be limited to 10 cfs as stated. The average flow of this stream is approximately 21 cfs and there may be times when it would be desirable to release more than 10 cfs through the irrigation outlet works. Because a project objective is to enhance the Boulder River fishery, more analysis of flow is needed. Since riverside lands are in private or State ownership, the predicted increase of 800 fisherman days, without additional access to the river should be explained."

Response:

Based on recommendations of biologists of the Fish and Wildlife Service, Montana Department of Fish and Game, and Soil Conservation Service, a release of 10 cfs in the Little Boulder below the dam during the irrigation season was determined to be adequate and non-erosive. The outlet works at the dam are capable of releasing up to 35 cfs if deemed necessary. An intensive analysis has been made of the flow regimes in the Little Boulder and Boulder Rivers. Biologists from the Fish and Wildlife Service, Montana Department of Fish and Game, and Soil Conservation Service jointly agreed that implementation of this project will enhance the fishery in the Boulder River. Agreement was reached that this enhancement would provide an increase in fish production (800 fisherman days). Access to the fishery resource has been good. Future access will depend on sportsman-landowners relations, but is expected to continue.

i. Comment:

"Treatment of the hydrology and geology of the Boulder River Valley should be much more extensive, particularly since the primary objective of the project is to furnish water to lands that presently are irrigated and, in part, nearly waterlogged."

Response:

The primary objective of this project is to rehabilitate the present irrigation distribution system, alleviate water shortages, and increase irrigation efficiencies. This will be accomplished by eliminating water shortages on 4,500 acres and allowing ranchers to shift irrigation from 2,800 acres of Class IV, V, and VI land to 6,200 acres of Class II and III land. Bottomlands with high

water table conditions will not continue to be irrigated, thereby reducing these high water table conditions.

j. Comment (summarized):

The thickness and hydrologic characteristics of alluvial fill in the Boulder River valley should be discussed. Thickness should also be given for other valley deposits. Saturated thicknesses and transmissivities should be presented.

Response:

The thickness and hydrologic characteristics of the alluvial fill and tertiary sediments vary throughout the Boulder River valley. Data were reviewed from existing drill logs along the Boulder River. These data indicate that permeable materials in the alluvial fill are relatively thin and transmissivities would be low.

k. Comment:

"A discussion of the observed and potential well yields from the valley fill would be helpful in evaluation of the possibility of using groundwater instead of water from the Little Boulder for irrigation."

Response:

Based on past records of irrigation well developments along the Boulder River, potential yield from this source is very limited. Sufficient water supplies could not be developed from wells to serve the project needs. An extensive number of irrigation wells developed in alluvium would have severe adverse effects on surface flows in the Boulder River valley. In addition, development of large-capacity irrigation wells would seriously affect existing shallow domestic wells which are producing from the alluvial sediments. Potential well sites would have to be located along the valley alluvium. A total lift of 400-500 feet would be required to irrigate benchlands on the west side of the Boulder River.

l. Comment:

"The statement (page II-24, lines 13-14) that identifies the fill as capable of furnishing 'limited' water should be quantified."

Response:

Domestic wells in the alluvial valley typically yield 15-20 gallons per minute. These yields are adequate for household and livestock

use. Wells in the tertiary age sediments have yields ranging from 5-15 gallons per minute. These volumes are considered adequate for stockwater needs.

m. Comment:

"A saturated thickness map of the valley fill would be useful in determining the fill's potential as an aquifer, and a depth-to-water map would identify waterlogging problems that now exist."

Response:

A saturated thickness map and depth-to-water map are not available for the project area. Based on geologic interpretation and supplemented by present well data, there is no possibility that full water supply could be developed for the project area. Preparation of these maps is not warranted for development of this project.

n. Comment (summarized):

What will happen to these wet areas with the planned irrigation changes?

Response:

Wet cropland areas will be reduced due to improved irrigation water management.

o. Comment (summarized):

Discussion on page II-24 indicates small streams lose their water where they cross benchlands and recharge valley fill; however, wet conditions are blamed on overirrigation. How long does the high water table persist and how will additional irrigation affect the project?

Response:

Small streams cease to flow in late spring or early summer. High water table conditions persist throughout the irrigation season. Project irrigation is expected to improve these conditions due to more controlled use of water and improved irrigation efficiencies.

p. Comment:

"The quality of groundwater in the project area does not seem to have been considered; however, pollution of the Boulder River by heavy metals from mining operations above Boulder is mentioned (page II-23). Effects of the Little Boulder River impoundment

and water-use schedule on the quality of groundwater in the alluvium of the Boulder River Valley should also be considered, inasmuch as groundwater recharge to the alluvium of Little Boulder River below the dam will be reduced (page I-51; WWP) and distribution of impounded water from the reservoir will alter the groundwater/surface water regimen."

Response:

Detailed field studies by federal and state agencies were made to analyze water quality and identify sources of heavy metal pollution. These pollution sources were old mine tailings located along the Boulder River upstream from the watershed. These tailings are located on low terraces above the flood plain. Heavy metal pollution is induced into the stream system only during high flood flows. Heavy metal contamination does not occur during normal or low flow periods of stream flow.

q. Comment (summarized):

Boulder River Watershed investigations did not consider mining or mineral resources in the draft plan. The Soil Conservation Service addressed them in the draft statement but it failed to conduct sufficient mineral resource studies or discuss future production potential in the proposed reservoir. Have private investigations covered all lands that the reservoir will inundate?

Response:

A detailed geological analysis of the mining area was conducted by the State of Montana and private industry for lands that will be inundated and other lands near the reservoir. The highest concentration of silver and gold is located in the area referred to as the "Chinese Diggings" located on the northwest edge of the reservoir basin. Mining in this area has been restricted by large quantities of overburden. Recent mining operations have not succeeded economically even in areas of less overburden. Borrow material excavation for this project is expected to reduce overburden volumes and enhance economic conditions for mining. Potentially commercial mineral deposits are concentrated in a small area as placer deposits. Mining of this area could be completed during the project construction period.

r. Comment (summarized):

The extent and location of sand, gravel, clay, and durable rock deposits should be delineated on maps and evaluated in the text.

Response:

Detailed investigations and evaluations of these deposits were made in the area in and around the reservoir basin. This evaluation was made to inventory and determine the adequacy of materials for construction. Page E-18 of the final EIS has been revised to reflect the degree of study.

s. Comment (summarized):

SCS should delineate the mineral deposits of the Elkhorn Mountains on maps and evaluate their present production and future potential.

Response:

The project will not affect nor impact on these mineral deposits either physically or economically.

t. Comment:

"The Boulder, Elkhorn, Golconda, State Creek, and Whitehall mining districts extend into the watershed. Likewise, the Elkhorn Creek placer on Elkhorn Creek and the Wilson Creek placer on Little Boulder River at least lie partially within the study area. Logically, the SCS should discuss each of these separately."

Response:

The project will not affect nor impact on these mining districts either physically or economically.

u. Comment (summarized):

The final EIS should contain results of consultation with the State Historic Preservation Officer concerning whether an old stage station site or other property in the project area is eligible for inclusion in the National Register of Historic Places.

Response:

The State Historic Preservation Officer declined to render an opinion on the eligibility of the stage station for inclusion in the National Register of Historic Places. Additional testing has been recommended by the National Park Service as a basis for determining eligibility. No other cultural resources exist in the project's area of potential adverse impact.

v. Comment:

"The statement should contain information to show that all significant cultural resources within the project's zone of potential adverse impact to such resources have been identified. The fact that such resources are not now known to the State Historic Preservation Officer, the Montana Historical Society, of the Department of Anthropology of the University of Montana should not be used to support the conclusion that such resources do not exist. We suggest that significant historic structures associated with the old Elkhorn mining community may exist in the area."

Response:

See response above. The project will not affect cultural or historic resources associated with the old Elkhorn mining community.

w. Comment:

"On page II-74, we note 'The Montana Statewide Archeological Survey' has surveyed the dam site and the reservoir area. However, the draft statement should indicate whether the surveys encompass all affected areas identified on pages I-11 and I-12, including borrow areas, access road alignments, and powerline rights-of-way."

Response:

The surveys included the borrow areas, access roads, and powerline rights-of-way.

x. Comment:

"The final statement should indicate the magnitude and significance of impacts on all properties listed on or eligible for listing on the National Register. Compliance with Section 106 of the National Historic Preservation Act of 1966 and the procedures of the Advisory Council on Historic Preservation (36 CFR 800) should be evidenced in the statement."

Response:

The eligibility of the old stage station site is pending the discovery of significant artifacts during remaining testing. No other properties listed on or eligible for inclusion on the National Register will be affected by this project. SCS has complied with Section 106 of the National Historic Preservation Act (PL-89-665) and Executive Order 11593. Any recovery operations will be performed in accordance with Public Law 93-291.

y. Comment:

"It is difficult to determine how the project will contribute to balancing ranch operations (page II-41) without causing environmental degradation. Converting bottomland into pasture will impair riparian vegetation, especially if numbers of livestock are increased. The secondary impacts of this action on wildlife and fisheries are not mentioned. It is doubtful if the proposal will correct all "unbalanced" ranching operations. This is more likely a result of land ownership patterns rather than cropland or pastureland which may be developed or improved by the project."

Response:

Ranching operations in the Boulder valley are unbalanced with respect to the winter feed and summer forage. The project will allow ranchers to shift hay production from bottomland sites better for pasture to benchland sites now in dry cropland, thereby increasing production of hay and pasture and decreasing the incidence of purchasing winter feed and trucking cattle out to summer pasture.

z. Comment (summarized):

It is implied that population within the 50-mile radius of the proposed reservoir site was used as the recreation market area and it is not realistic to use this population to compute potential recreational use because Canyon Ferry Reservoir is within the zone of influence.

Response:

The population within the 50-mile radius was computed and discounted in view of competing facilities in the zone of influence. The proposed reservoir on the Little Boulder River will offer a unique recreational experience. Its size, 350 surface acres, and setting, a small valley surrounded by mountains and timbered slopes, will give the recreationist and sportsman a sense of seclusion.

a.1. Comment:

"Because of a difficulty of interpreting the estimated recreation use figures, a brief discussion of the definitions and methodology used to obtain the estimates should be provided in the final statement. Regardless of the number of potential visitor days, the impact of that use upon the environment and, in particular, community services, should be treated in detail."

Response:

General recreation use was estimated by analyzing the population of the recreation market area and adjusting it for competing facilities. Consideration was also given to the proximity of the interstate highway and the fact that this route is one of the links between Yellowstone and Glacier National Parks. The developed recreational area and its facilities were used to estimate the supply of recreational visitor days. Fisherman use was estimated jointly by personnel of the U. S. Fish and Wildlife Service, Montana Department of Fish and Game, and Soil Conservation Service. Community services in Boulder, such as health, fire, and police, will not be appreciably affected by a day use recreational facility three miles from Boulder.

b.1. Comment:

"In the discussion on page II-46, lines 12-13 mention pollution abatement after (line 4) mentioning heavy metal pollution. Nowhere in the proposed action is found any remedy for heavy metal pollution. The heavy metals are specifically identified as coming down the main Boulder River; the dam and reservoir proposed will have no effect on the source of the metals. Instead, (page II-52, lines 10-15) irrigation returns might dilute heavy metals in the summer but storage of irrigation water in the reservoir in winter will result in an increase in heavy metals pollution. Therefore, the amounts of heavy metals would not be changed; their concentrations would be. Under "Alternatives" (page II-64, lines 8-10) it is suggested that the presence of heavy metals is not going to be affected by the proposed project."

Response:

Noted. See response to comment "p" above.

c.1. Comment:

"The discussion on page II-8 indicates that irrigation releases will result in an average annual drawdown of 36.3 feet and a maximum drawdown of 49 feet. Because portions of the recreation season and the irrigation season are concurrent, the impacts of drawdown on recreation use should be analyzed in the environmental impact section. The analysis of impacts should also include the effect of the drawdown on the fishery."

Response:

The reservoir will be 89 feet deep when full. The average summer pool will be about 70 feet deep and the minimum permanent recreation

pool will be 40 feet deep. The reservoir will be filled during spring runoff. Drawdown of the reservoir will not begin until July, which is well into the recreation season. The maximum drawdown occurring in late August or early September is expected only during dry years (two years out of ten) and will still provide a permanent recreational pool 40 feet deep. These drawdown conditions were considered in the development of fisherman and general recreational use expected at the reservoir.

d.1. Comment:

"On page II-37, a discussion is provided of the Forest Service campground 4.3 miles above the proposed dam site, yet no information is provided in the environmental impact section (pages II-48 to II-63) on the probable impacts of the proposal on this facility."

Response:

Use of this facility will increase. Discussion has been added to the impact section.

e.1. Comment:

"We question the contention that sedimentation and erosion will be reduced (page II-58) by changing from dry cropland to irrigated, particularly since land slopes of up to 8% will be cropped, and surface flood irrigation will continue on part of the cropland."

Response:

Sedimentation and erosion will be reduced since more land in the valley will be seeded to hayland and have permanent vegetative cover. Gravity irrigation will occur only on slopes of 2-3 percent where slope is not a critical factor. Steeper slopes will be sprinkler irrigated.

f.1. Comment:

"If sprinkling will contribute to increased return flow, how will a reduction in high water table conditions be attained? What was the basis for projecting irrigation groundwater return flow to the Boulder? Is it probable that return flow will occur in August, considering soils permeability and aquifer transmissivity?"

Response:

Sprinkler irrigation will not contribute to increased return flow. The improved distribution of irrigation water annually over an expanded acreage will provide for a more uniform return flow and thus increase return flows during the low flow period in August and September.

g.1. Comment (summarized):

How will the project reduce high water table conditions?

Response:

Much of the high water table conditions are attributed to overapplication of water during the early part of the irrigation season. See comment "f.1." above.

h.1. Comment:

"The DES does not treat the effects of secondary impacts such as the road rerouting through game winter range, the closing of the two land fill dump sites and the rerouting of the power line (page II-9). The road relocation will, for instance, require upgrading of the road leading to the May Day mine. This will entail visual and wildlife impacts on the May Day road. The visual impacts of the powerline relocation should also be mentioned."

Response:

The road relocation to provide access to the Little Boulder will follow the present road alignment above the reservoir high water line. There will be no impacts to game winter range and the May Day mine road will not be upgraded. The plan and EIS have been revised to reflect this change. The two land fill sites have already been closed due to the formation of sanitary disposal district in Jefferson County. The closures are not a part of this project. The EIS was revised to reflect visual impacts of the powerline relocation.

i.1. Comment:

"Is relocation of the Boulder River School's recreation facilities to an area adjacent to a proposed heavy use area feasible or in the best interests of the patients? Would the semi-secluded nature of the present development and the type of environment be of greater benefit to the patients? These social impacts should be covered in the DES."

Response:

Aspects of the relocation of the Boulder River School and Hospital's day camp have been discussed with staff members of the school. The proposed relocation will be a secluded area overlooking a 350-acre reservoir. It will provide a diversified recreational environment for patients of the school. Officials of the Boulder River School and Hospital believed that the day camp area could be satisfactorily relocated in an area adjacent to the public recreational use area. See figure 7. Opportunities are still available to relocate the day camp elsewhere, such as along the Little Boulder River above the reservoir basin.

j.1. Comment:

"The sections, 'Adverse Environmental Impacts,' 'Short-Term versus Long-Term Use of Resources,' and 'Irreversible and Irretrievable Commitments of Resources,' have not addressed the loss of mineral resources or the production potential within the study area if the proposed project is constructed."

Response:

During project construction, overburden will be removed and used for embankment material, thus providing the opportunity for more economical removal of the mineral resources. The project will enhance production potential of existing mineral resources in and around the reservoir basin.

Approved by:



Van K Haderlie
State Conservationist

5/7/76

Date

APPENDICES

APPENDIX A--Comparison of Benefits and Costs for Structural Measures

APPENDIX B--Figure 1--Plan and Profile of Dam

Figure 2--Cross Sections of Dam

Figure 3--Profile of Spillways

Figure 4--Irrigation Diversion Structure

Figure 5--Irrigation Demand and Supply

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Figure 7--Recreational Proposal

Figure 8--Project Area Map

Figure 9--Project Map

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APPENDIX D--Bibliography

APPENDIX A

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Boulder River Watershed, Montana

(Dollars) 1/

Evaluation Unit	<u>AVERAGE ANNUAL BENEFITS^{1/}</u>			<u>Average^{2/}</u> Annual Cost	Benefit:Cost Ratio
	Irrigation	Recreation	Secondary	Total	
Multipurpose Reservoir, Canals and Appurtenances, and Recreational Facilities	466,900	108,100	99,180	674,180	392,600 1.7 to 1.0
Project Administration				57,200	
GRAND TOTAL	466,900	108,100	99,180	674,180	449,800 1.5 to 1.0

1/ Current normalized prices for crop and pasture values and 1975 prices
for other values

2/ From table 4

March 1976

APPENDIX B

SCALE: 1" = 400'

PLAN VIEW

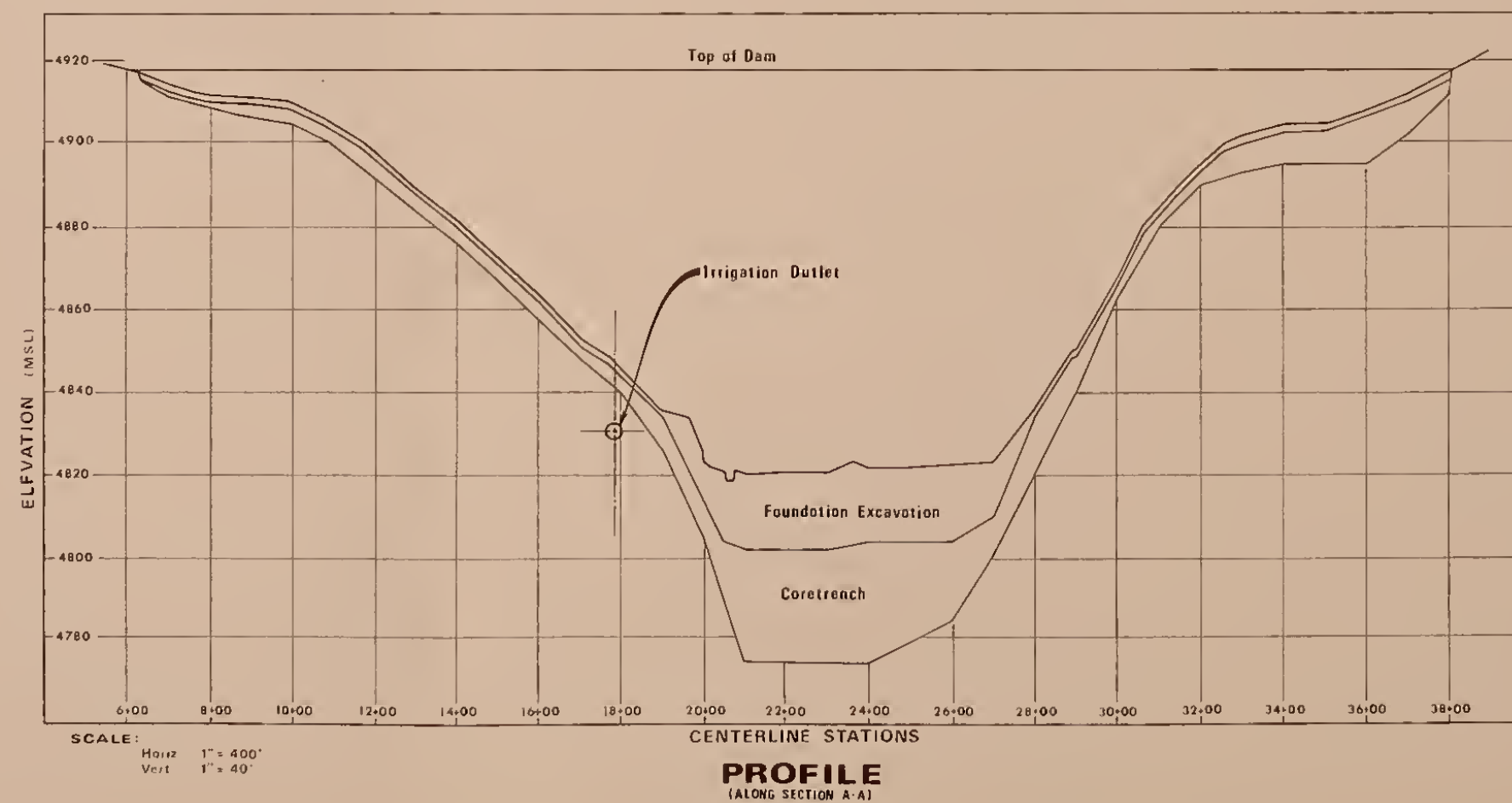


Figure 1

PLAN AND PROFILE OF DAM

Boulder River Watershed
Jefferson County, Montana

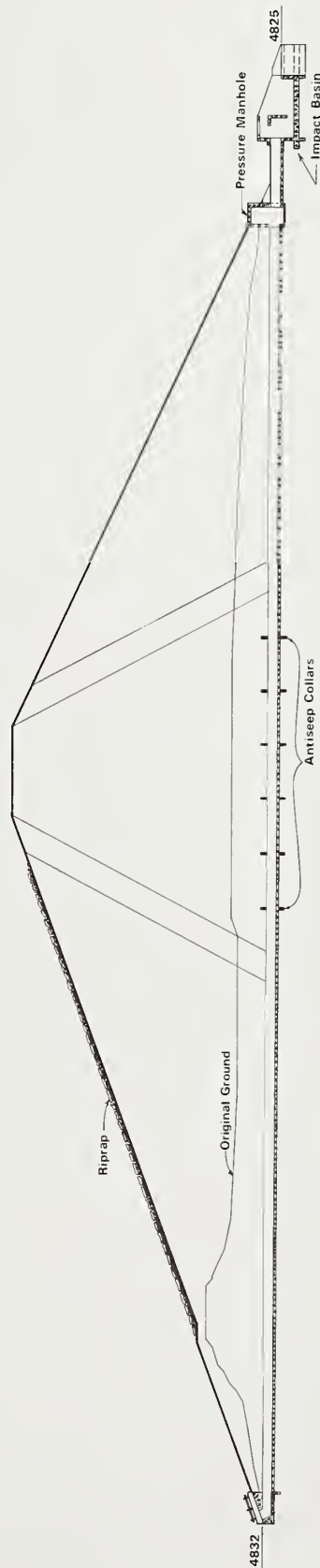
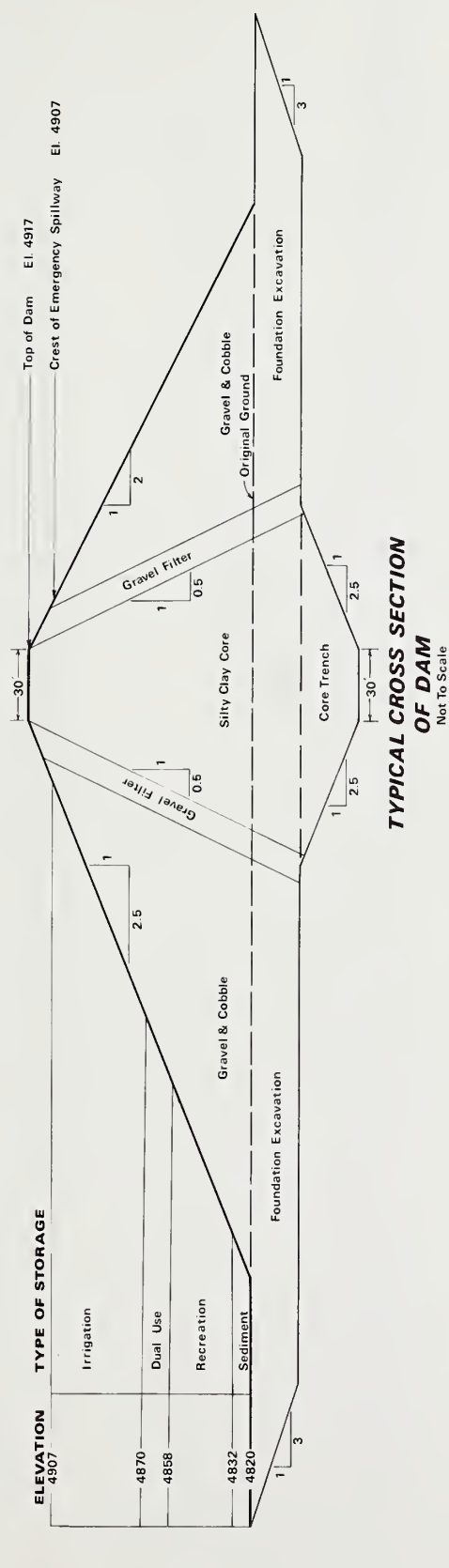
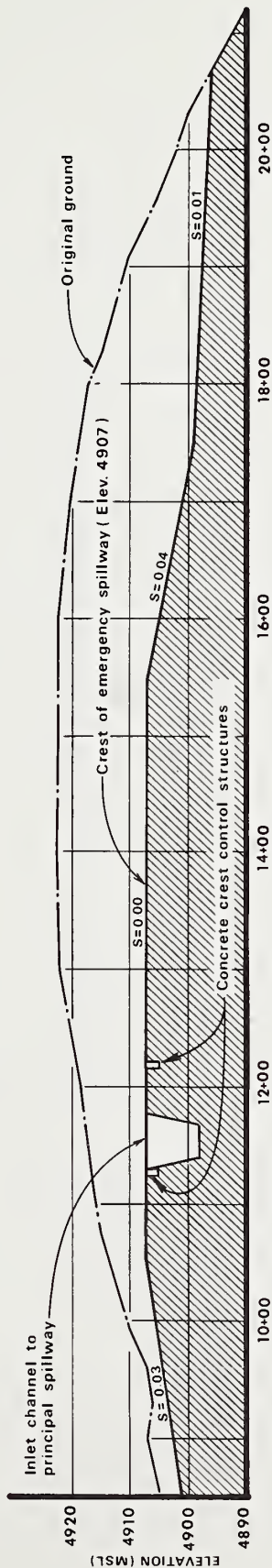
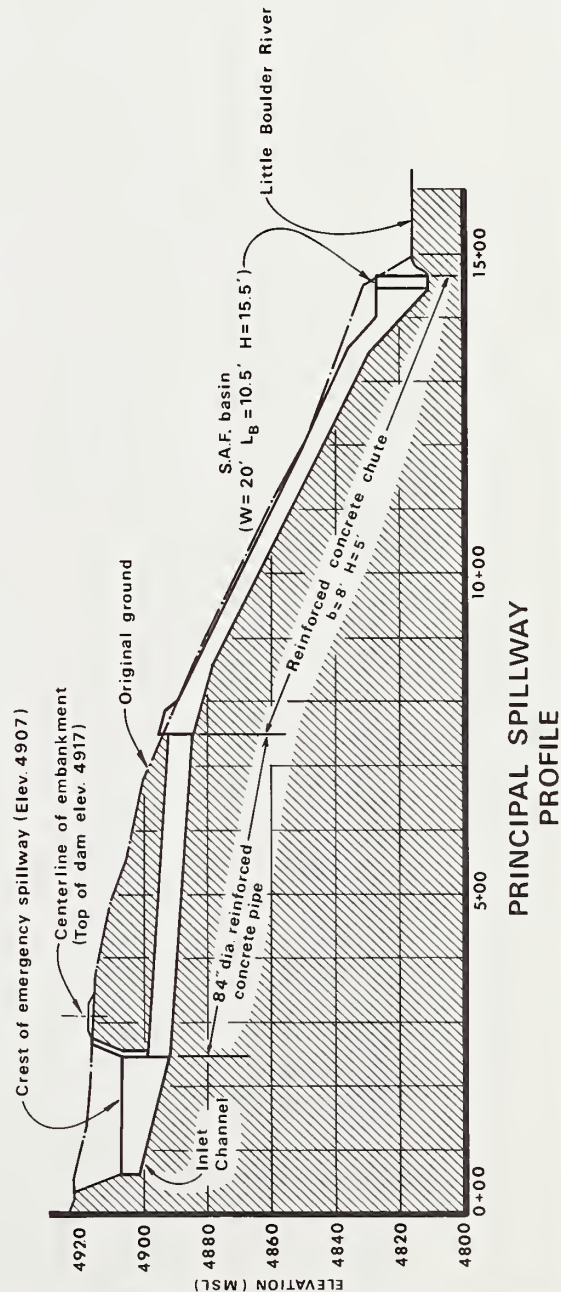


Figure 2
Cross Sections Of Dam
Boulder River Watershed
Jefferson County, Montana



EMERGENCY SPILLWAY
PROFILE



PRINCIPAL SPILLWAY
PROFILE

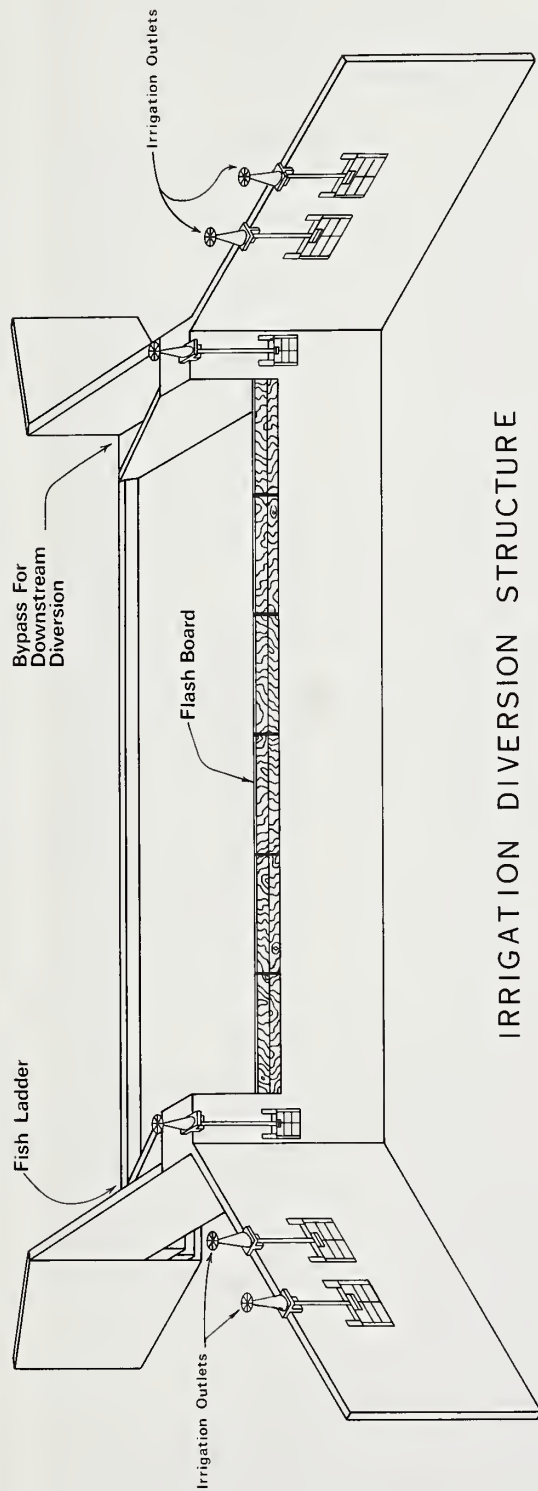
Figure 3

PROFILE OF SPILLWAYS

BOULDER RIVER WATERSHED
JEFFERSON COUNTY, MONTANA

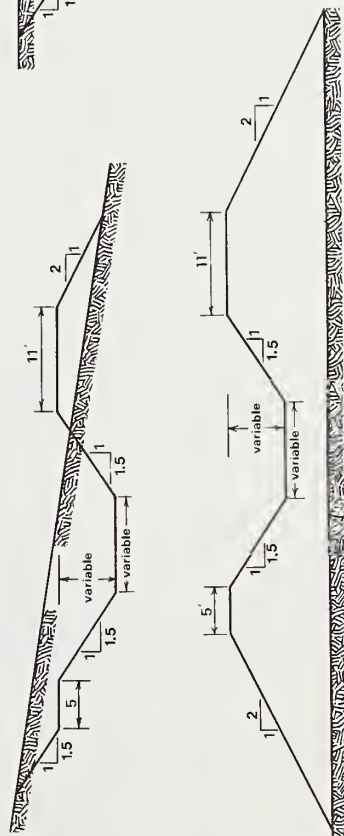


FROM CONSERVATION SERVICE



IRRIGATION DIVERSION STRUCTURE

Not To Scale



TYPICAL CROSS SECTIONS
OF IRRIGATION CANAL

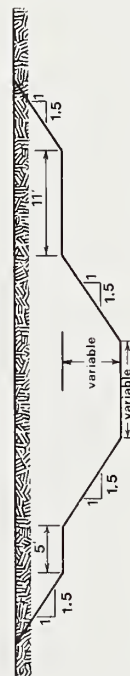


Figure 4

IRRIGATION DIVERSION STRUCTURE & TYPICAL CROSS SECTIONS OF IRRIGATION CANAL

BOULDER RIVER WATERSHED
JEFFERSON COUNTY, MONTANA

Figure 5

Irrigation Demand and Supply Boulder River Watershed

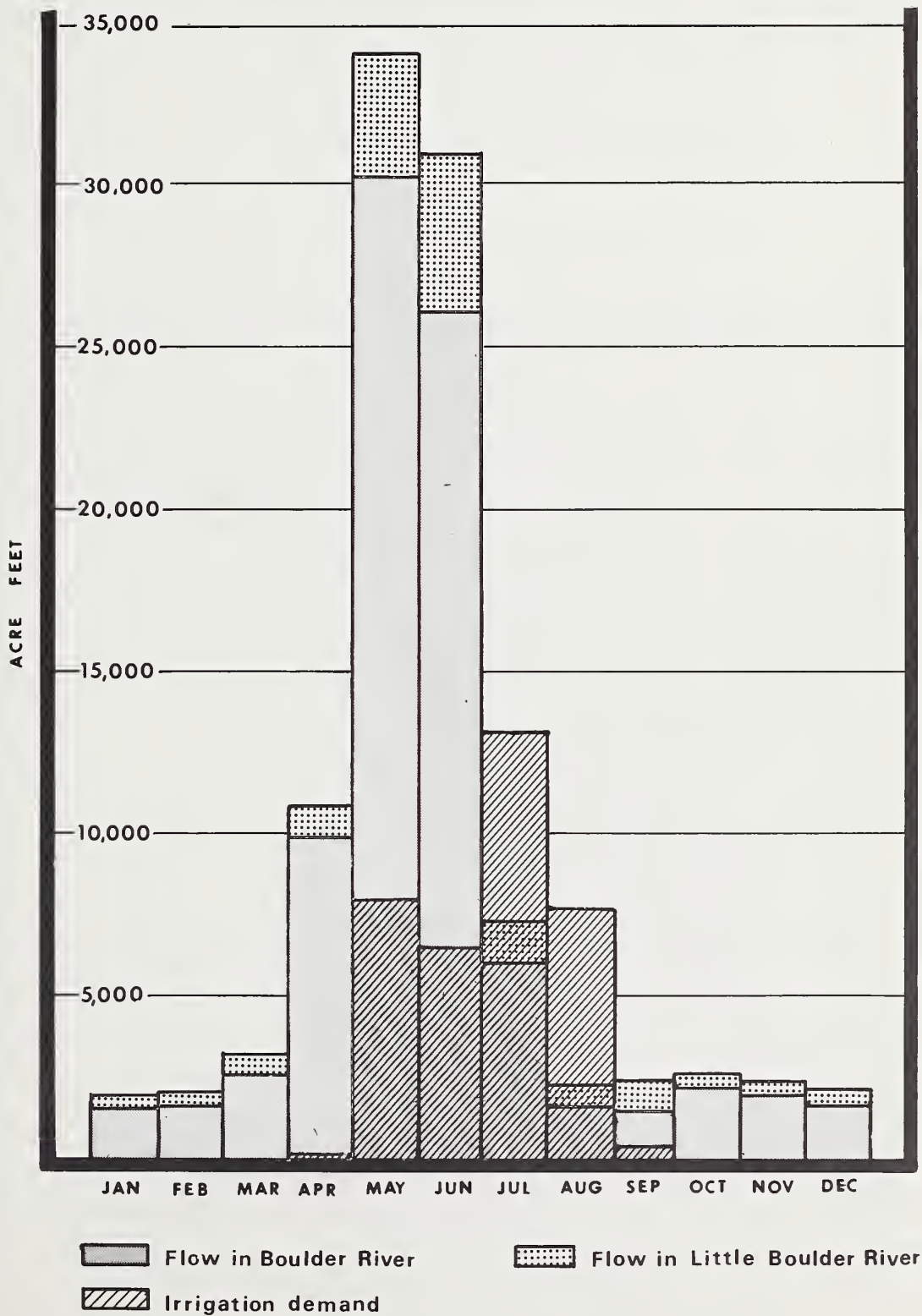
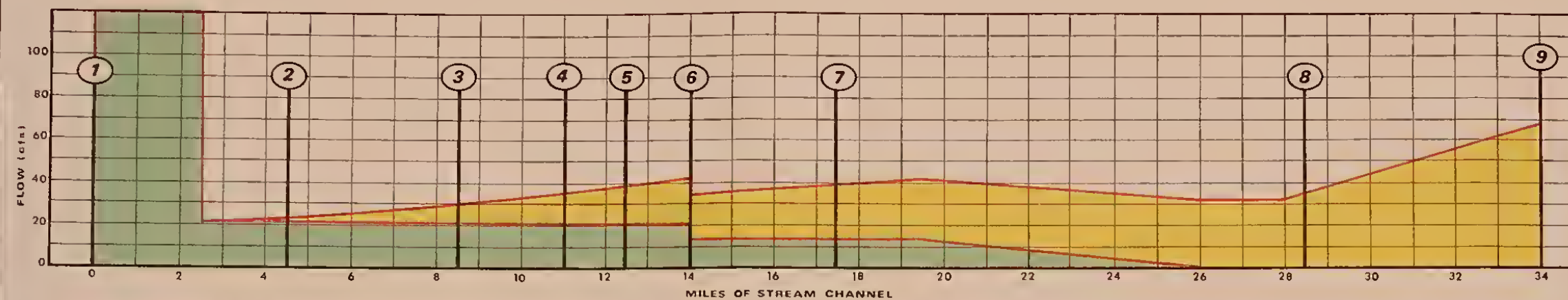


Figure 6

Streamflow Evaluation

BOULDER RIVER WATERSHED

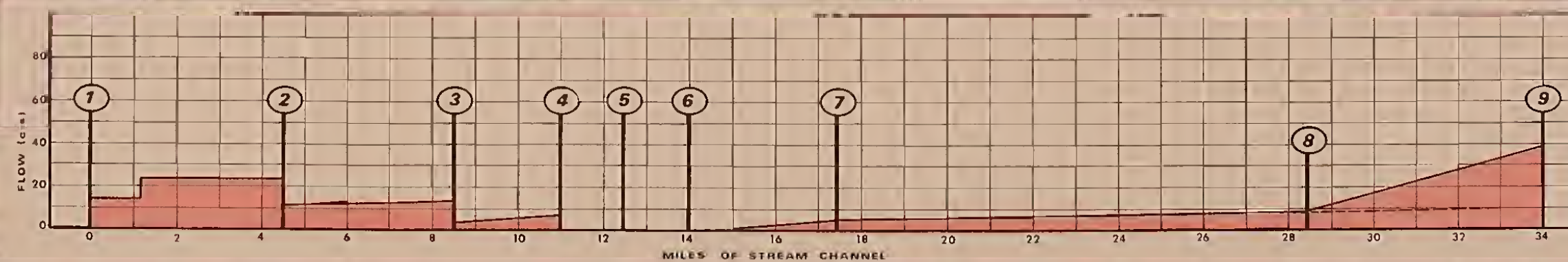
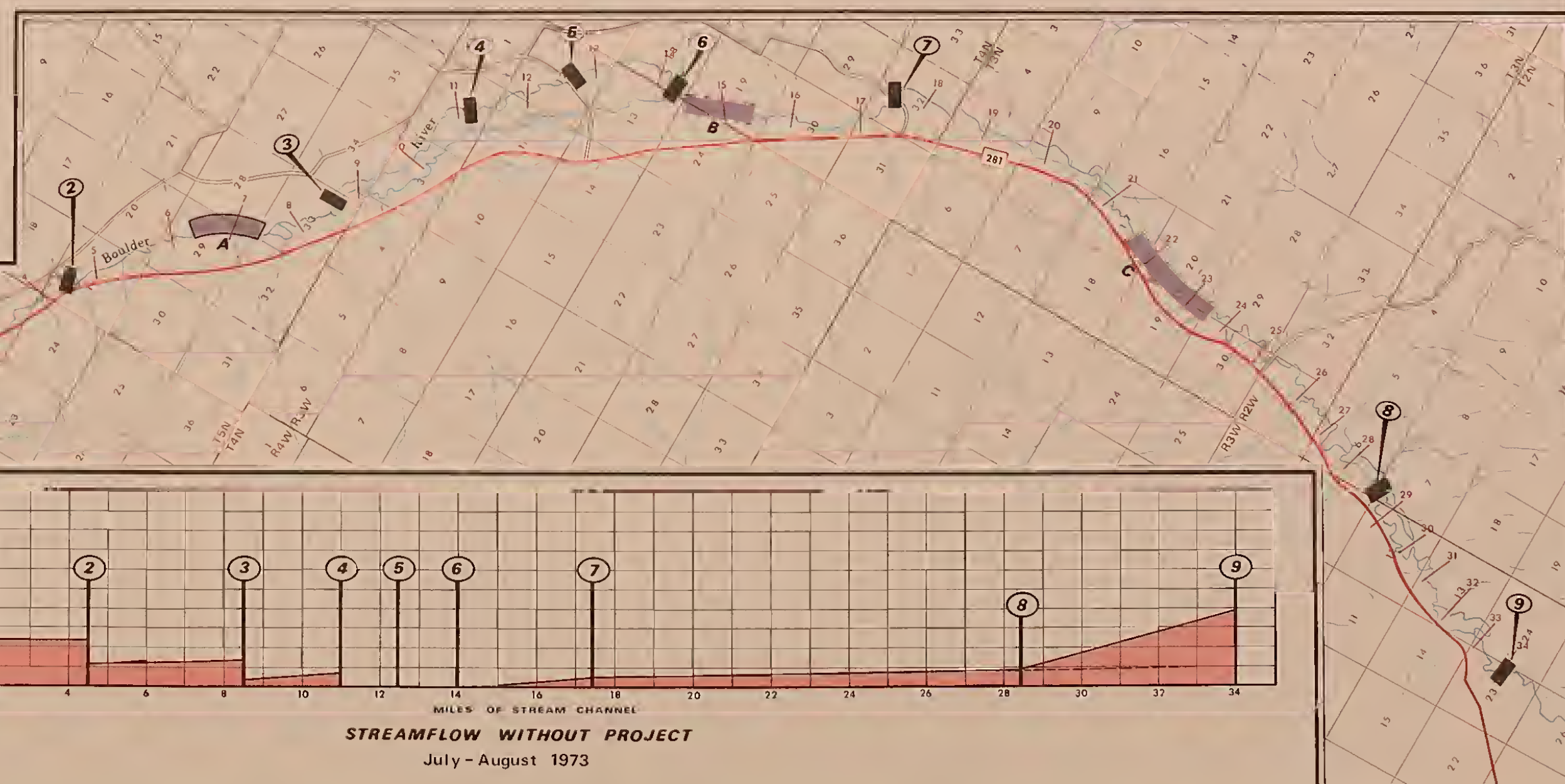
JEFFERSON COUNTY, MONTANA

**LEGEND**

- Irrigation water with project
- Irrigation groundwater return flow with project
- Measured July-August streamflow without project
- Detailed study reach
- Streamflow measurement station
- Miles of stream channel

STREAMFLOW WITH PROJECT

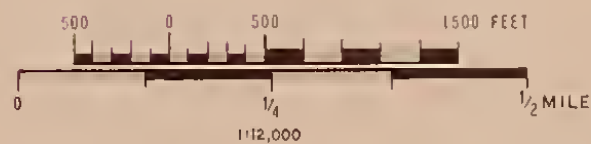
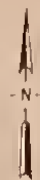
August (average)

**STREAMFLOW WITHOUT PROJECT**

July - August 1973

LEGEND

Acquisition line	— — — — —
Average Recreation Season Pool	— — — — —
Upper Reservoir Storage	— — — — —
Access Road	— — — — —
Recreation Area	— — — — —
Cattle guard	— — — — —
Table	— — — — —
Grill	— — — — —
Toilet	— — — — —
Trail	— — — — —
Taking line	— — — — —



BOULDER RIVER
SCHOOL
AND
HOSPITAL
DAY CAMP
AREA

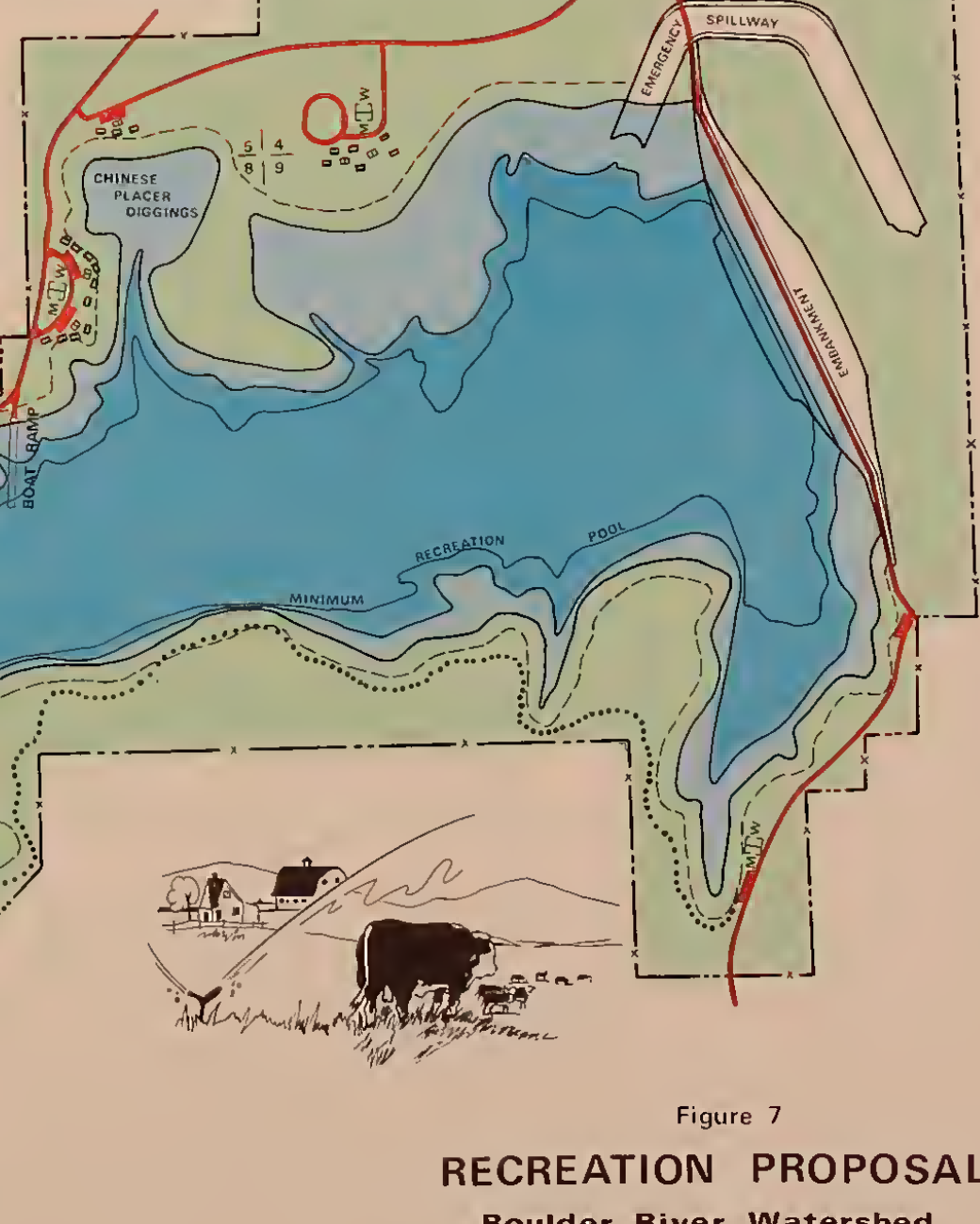
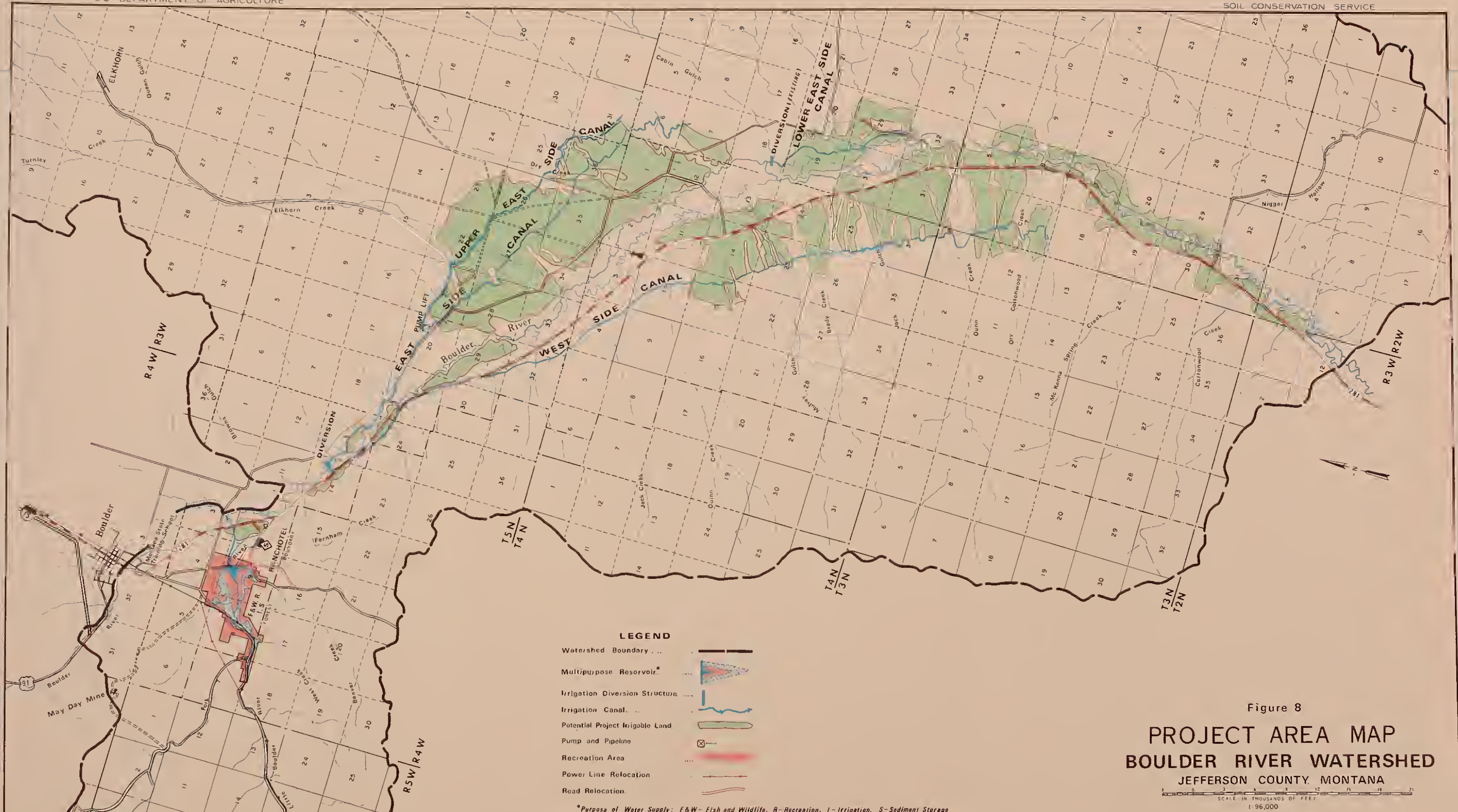


Figure 7
RECREATION PROPOSAL
Boulder River Watershed
Jefferson County, Montana



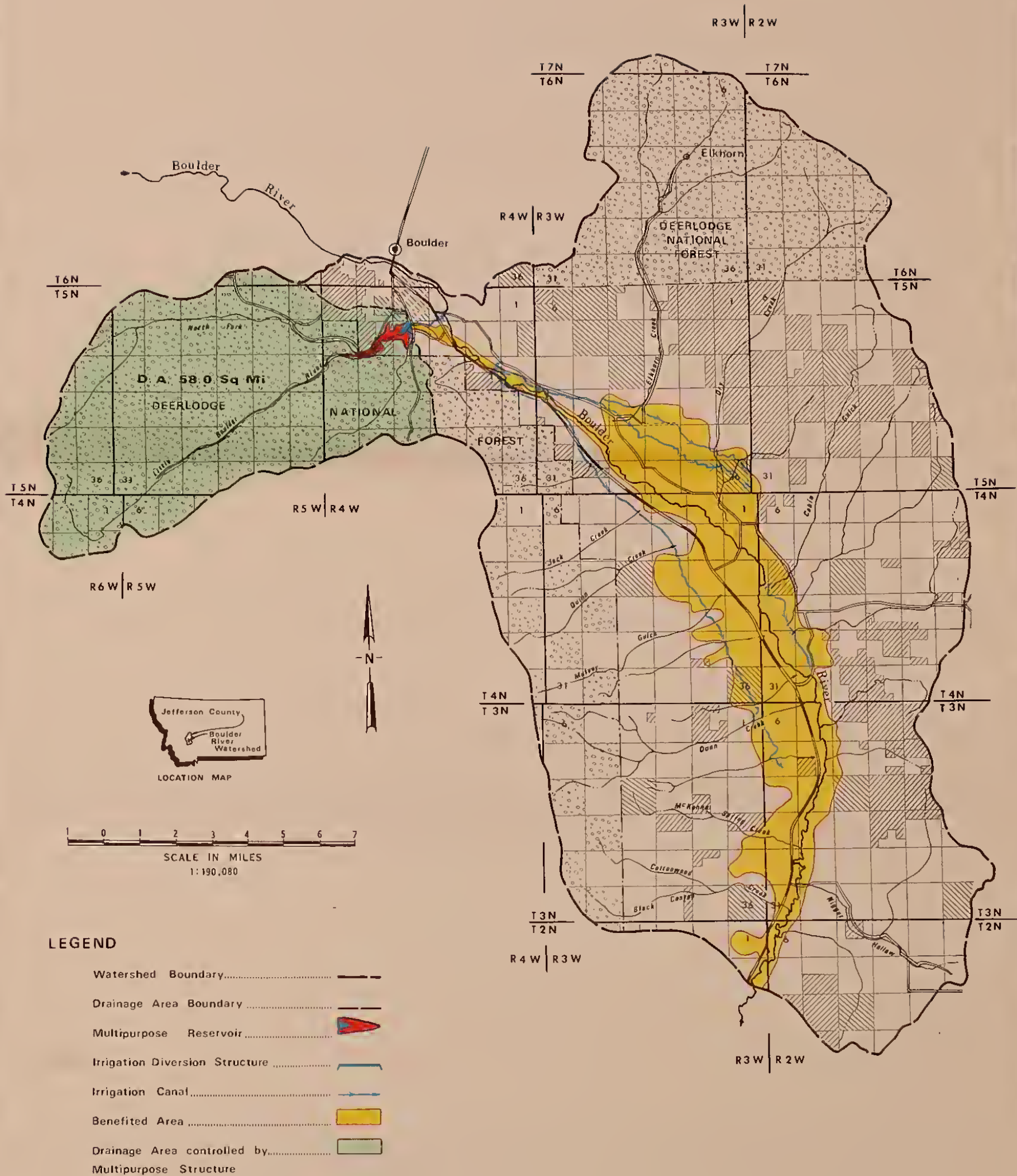


FIGURE 9

PROJECT MAP

BOULDER RIVER WATERSHED

JEFFERSON COUNTY, MONTANA

APPENDIX C

THC



State of Montana
Office of The Governor
Helena 59601

THOMAS L. JUDGE
GOVERNOR

February 26, 1976

Mr. Van K. Haderlie
State Conservationist
Soil Conservation Service
Box 970
Bozeman, Montana 59715

Dear Van:

I referred the Boulder River Watershed draft work plan and environmental impact statement which accompanied your January 9 letter to me to the Montana Department of Natural Resources and Conservation (DNRC) for review and comment.

As you know, the DNRC has worked with the Soil Conservation Service and the project sponsors over a long period of time to bring this project to fruition; they have recommended acceptance of the plan and impact statement as you submitted them to me.

I am, therefore, pleased to give my endorsement to the draft work plan and draft environmental impact statement for the Boulder River Watershed as submitted.

Best personal regards.

Sincerely,

A handwritten signature in dark ink, appearing to be "Tom" or "Tom L. Judge", written in a cursive style.

THOMAS L. JUDGE
Governor



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

1 MAR 1976

Honorable Robert W. Long
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83rd Congress, the Montana State Conservationist of the Soil Conservation Service, by letter of 9 January 1976, requested the views of the Secretary of the Army on the work plan for the Boulder River Watershed, Montana.

We have reviewed this work plan and foresee no conflict with any projects or current proposals of this Department. The draft environmental statement satisfies the requirements of Public Law 91-190, 91st Congress, insofar as this Department is concerned.

The Montana State Conservationist should be informed that regulatory permits will be required for work that affects navigable waters and requests for such permits should be made to the Omaha District Office of the Corps of Engineers at the earliest possible date.

Sincerely,

Charles R. Ford
Deputy Assistant Secretary of the Army
(Civil Works)





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80203

Re: 8W-EE

MAR 9 1976

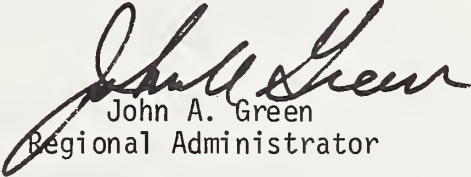
Mr. Vern K. Haderlie
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 970
Bozeman, Montana 59715

Dear Mr. Haderlie:

Thank you for the opportunity to review the draft environmental impact statement for the Boulder River Watershed, Jefferson County, Montana. If the mitigation measures outlined on this document are followed, the project described should be environmentally acceptable and should not cause the violation of environmental standards.

According to EPA's rating system for draft environmental impact statements, this project has been rated LO-1 (lack-of-objections - sufficient information). Again, EPA has made this rating based on the assumption that the mitigative measures (erosion control, wildlife protection, etc.) will be a basic part of the project. If you have any questions, please contact my office.

Sincerely yours,


John A. Green
Regional Administrator



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGION VIII

FEDERAL OFFICE BUILDING
19TH AND STOUT STREETS
DENVER, COLORADO 80202

OFFICE OF THE REGIONAL DIRECTOR

February 17, 1976

Mr. Van K. Haderlie
State Conservationist
Soil Conservation Service
Department of Agriculture
P. O. Box 970
Bozeman, Montana 59715

Dear Mr. Haderlie:

Thank you for the opportunity to review the draft Environmental Impact Statement for the Boulder River Watershed, Montana, and the draft watershed work plan.

It appears to me that the impacts expected to result from the proposed project and reasonable alternatives thereto have been adequately addressed.

Sincerely,

Rulon R. Garfield
Regional Director

cc: Office of Environmental Affairs,
Washington, D. C.



STATE OF MONTANA



DEPARTMENT OF

FISH AND GAME

Helena, Montana 59601
January 30, 1976

Mr. Van K. Haderlie
State Conservationist
Soil Conservation Service
P. O. Box 970
Bozeman, Montana 59715

Dear Mr. Haderlie:

During your earlier planning efforts, the Department of Fish and Game was requested to financially support the Boulder River Watershed project. Our Commission supported Alternative No. 1 of your Service's Boulder River Watershed Project and agreed, subject to availability of funds and legislative appropriation, to fund the nonfederal fish and wildlife portion of the project's cost, provided the following conditions could be met during the remainder of the planning process.

1. That water quality problems now indicated in and above the project area will be defined and sources and causes of water quality problems will be determined, and that following necessary studies to define and identify any water quality problem, a program will be designed and implemented to abate or control said sources and causes.
2. That as part of the project, the sediment pollution from the lower project area will be minimized.
3. That fisherman access be guaranteed in the project area for the life of the project.
4. That a land-use agreement on the streambanks be developed which will provide that any stream alterations by project sponsors or other parties will come under the provision of the Montana Stream Preservation Act and that brush will be encouraged in the floodplain.
5. That the 10 cfs release for fisheries, the flows from irrigation releases between points of diversion presently planned, and the Soil Conservation Service's predicted return irrigation flows be reserved as a minimum flow for fish and wildlife by the Department of Natural Resources prior to final commitment of our funds to this project.

Our first comments are referred to these five conditions:

Condition No. 1

The problems with heavy metals has been recognized (pages II-23, II-33, II-45). We agree this problem may be increased as a result of storing winter flows, which would reduce influence of the Little Boulder River. Even with increased flows, heavy metals problems may continue to suppress populations well below the potential of the stream, particularly in the upper stretches of the river. Thus, we believe your fisherman use projections are quite speculative since they appear to have been made with the belief that metals will not be a problem.

Currently additional water quality and fisheries studies are ongoing in the Boulder drainage through a cooperative effort of the Cooperative Fisheries Research Unit and the Department of Health and Environmental Sciences. We recommend this information be used in the planning process to provide more definitive data for the assessment of potential impacts of this project on water quality.

Condition No. 2

On page II-43, we agree that sediment increases as a result of high intensity summer storms is a problem. We disagree that the problem is localized to a 2-3 mile segment and suggest the greatest impact occurs from above Nigger Hollow bridge to the Shaw Ranch diversion where the heavier sands settle out.

In the project objectives on page I-8, watershed protection will be provided for 223,600 acres in the Boulder River Watershed through land treatment and structural measures. However, the emphasis is either on the watershed above the project area, primarily through road construction and fire protection on U.S.F.S. lands, or on lands in the project area primarily by construction of irrigation systems (page I-8, I-9, II-5, II-6). On Table 1A where dollar figures are presented, there is also no indication that measures will be taken to minimize the sedimentation from high intensity storms. We believe this sediment source is a serious problem in the drainage and that it can exert additional checks on the fisheries potential if not minimized. We also believe it would be to the ranchers benefit as well as the fisheries to plan measures as a part of this project to retain as much of the sediment as possible, rather than allow it to flow downstream.

Condition No. 3

With the expenditure of over \$3,600,000 in government funds (Table 2), we believe there should be some guaranteed benefits for the general public. To state that fisheries will increase is significant only if the public can use this resource. On page I-21, it is indicated that fishing access is not guaranteed along the Boulder River. A comment under the Alternative No. 3 for a single purpose irrigation reservoir with land treatment (II-66) states that access could not be guaranteed under this alternative which implies it could be under the selected alternative. The fifth alternative described on pages II-67 and II-68 is said to have provided access to 34 miles of Boulder River through acquisition of access points and foot easements. Although this access provision was discussed in previous drafts of the Boulder project, it was not guaranteed in any of the drafts we reviewed. Costs of land acquisition were not included and, at one local meeting our personnel attended, one of the project sponsors stated he would not consider selling a foot easement along the river through his property.

Condition No. 4

Riparian vegetation along the river is necessary to insure streambank stability and provide shade and cover. Potential reduction of riparian vegetation is indicated by the statement on page II-61 where it is noted that larger numbers of livestock will increase the pressure on riparian habitat that is within livestock use areas. This statement makes it questionable as to whether fish populations will be increased. We support your statement on page II-46, which states "if fish populations in the Boulder River are to be significantly increased, streambank vegetation protection and enhancement are essential". We still see no provision for land treatment measures that relates to this problem.

On page I-22 improved wildlife habitat from land treatment and structural measures is mentioned as an unevaluated benefit. The land treatment measure listed on Table IA which is most likely to materially benefit wildlife is improvement in proper grazing use. We question that any significant wildlife benefits will occur on 54,000 acres of private land from an expenditure of only \$1,620. Could this expenditure be expected to help protect riparian vegetation?

Streambank stability not only will result in better fisheries but in the long term will require much less expensive structural flood control projects by local sponsors.

As we stated in our previous comments, data gathered below dewatered areas, where seep return flows were evident, showed extremely high temperatures. This temperature problem is compounded by lack of streambank vegetation. Thus protection of the riparian vegetation assumes even more importance.

Condition No. 5

On Figure 6, streamflow projections indicate a constant flow of approximately 21 cfs below the main diversion structure; however, in the text, page II-14, it is stated that the main irrigation structure will provide for bypassing a minimum flow of 12 cfs during the irrigation season. If the 21 cfs figure is an average it should be so stated and both high and low flow projections should also be included. The less these releases fluctuate, the better the opportunities will be for fisheries enhancement. In general, a stream fishery is limited by the lowest flow periods. There is no indication how water rights will be addressed with this project. Would a state agency be reserving the minimum flow of 12 cfs? This is essential if your fisheries benefit projections are to be used.

We have the following additional comments which are not specifically related to any of the five conditions our Commission required for our participation in the original project. We still favor consideration of a land trade for the 80 acres of state lands to be acquired in fee title from the State of Montana. Rather than the public selling its land and then having to repay the sponsors for recreational use of the reservoir, perhaps it would be more desirable to trade sponsors land for state lands involved. Tracts could be obtained along the river in areas where the best annual flows and cover are anticipated.

On page I-32 you state drawdown below minimum pool will be made for dam repair and other purposes. To assure adequate stream flows can be maintained we recommend either dual outlet tunnels be installed so that releases can continue during repair periods or that a minimum flow from the main Boulder River be retained in the channel during periods when releases from the dam are curtailed.

On page II-48 you state the project will reduce sedimentation by three acre feet per year. Our experience with older reservoirs which have had to be drained for extended periods for repair or inspection purposes has shown a rapid flushing of retained sediments. Thus it is more accurate to describe a reservoir's effect on sedimentation as delaying rather than reducing.

Mr. Van K. Haderlie
Page Five
January 30, 1976

On page II-59, favorable environmental impacts Nos. 8 and 13 are not guaranteed by the project and it is questionable that they will occur.

On page II-41, you imply that flooding of the lowlands adjacent to the Boulder River is damaging. Periodic inundation of floodplains is a natural process that maintains the high fertility of these areas. To label this process as a "damage" that should be eliminated represents a very short term view of the basic function of rivers and their floodplains.

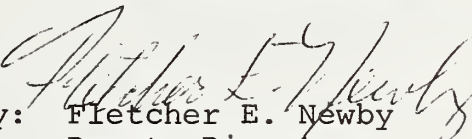
We believe your predicted 35,150 annual visitor days use of this project is high and question that this great a need presently exists in the area. A project benefit of this magnitude should be based on a study of recreational needs in the area.

Recreational facilities construction costs are extremely underestimated as shown in this statement. They do not reflect costs of these facilities if they are installed through the normal contracting processes and they reflect out of date unit prices.

Under separate cover, Ron Holliday, Administrator of our Recreation and Parks Division (also functions as the State Historic Preservation Officer), has given you his views concerning the Old Boulder Stage Station Site. These comments should be considered a part of our total Department response to this statement.

Sincerely,

Wesley R. Woodgerd
State Fish and Game Director


By: Fletcher E. Newby
Deputy Director

WRW/FEN/bd
cc: Art Whitney
Ron Marcoux
Ron Holliday

STATE OF MONTANA



DEPARTMENT OF

FISH AND GAME

Helena, Montana
January 13, 1976

Re: Old Boulder Stage
Station

Mr. Van K. Haderlie
State Conservationist
P. O. Box 970
Bozeman, Montana 59715

Dear Mr. Haderlie:

Thank you for your request concerning the Boulder River Watershed Work Plan EIS. We have reviewed the plan and the report concerning the Old Boulder Stage Station site and have talked with Dr. Sharrock about it.

This appears to be the only site that would be affected by the proposed dam and reservoir and would be directly in the axis of the dam.

The report reveals that no definite archival information has been found and recommends a salvage excavation to determine if and what, remains of the station.

In view of this doubt as to the location and significance of the remains of the station, I would like to see the results of a salvage excavation before rendering any opinion on the eligibility of the site in question.

Thank you for contacting me.

Sincerely,

Ron Holliday
State Historic Preservation Officer

RH/DC/bd



MONTANA BUREAU OF MINES AND GEOLOGY
MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY
BUTTE, MONTANA 59701
(406) 792-8321

January 26, 1976 .

Soil Conservation Service.
P.O. Box 970
Bozeman, Montana 59715

Gentlemen:

Here are some comments from the Hydrology staff regarding the proposed irrigation project for the Boulder River watershed.

1. It is estimated, in the EIS, that the project will improve fish production in the Boulder River, "resulting in an increase of 800 fisherman days per year on the lower 30 miles of the river". Because fishing access along this 30-mile reach is not guaranteed, will these "800 fishermen" be primarily landowners?
2. Increasing efficiency of present irrigation from 10% to 37% will reduce return flows, but might the addition of 3,400 acres of new irrigation (even at 37% efficiency) result in an increase in return flows?
3. If existing rights total 500 cfs, any increases in return flow might be picked up by people holding these rights. Therefore, the effect of the project on return flows is difficult to determine from data presented in the EIS.
4. Is a figure of 37% (for expected irrigation efficiency of the project) realistic?
5. Will the application of much larger quantities of irrigation water (even at greater efficiency) actually result in "reduction of high water table conditions on bottomlands"? Can we not expect to lose land on the bottom while we are

January 26, 1976

gaining it on the bench?

Thank you for soliciting our comments in this matter.

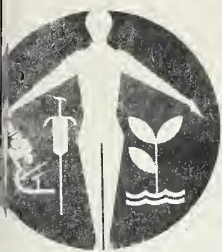
Sincerely,

A handwritten signature in cursive script that reads "David J. Smith". The signature is written in dark ink and is positioned above the printed name and title.

David J. Smith
Hydrogeologist

Copies to Marvin Miller

Peter Norbeck



Department of Health and Environmental Sciences
STATE OF MONTANA HELENA, MONTANA 59601

DIRECTOR
A: C. Knight, M. D., F. C. C. P.
ACTING DIRECTOR

December 30, 1975

Mr. Van K. Haderlie
State Conservationist
Soil Conservation Service
P. O. Box 970
Bozeman, Montana 59715

Re: Boulder River Watershed Work Plan
Environmental Impact Statement
and Addendum

Dear Mr. Haderlie:

Thank you for the opportunity to review the above referenced plans. As generally discussed in the plan, we agree with the concern expressed for potential erosion problems due to increased cattle usage of riparian vegetation and an increase in the number of irrigation return flows. We are also wondering if the increased availability of irrigation water will cause an acceleration in the clearing of riparian lands and create another erosion problem. As you know, sediment resulting primarily from poor land use practices is the major water pollution problem in Montana.

For purposes of enhancing the plan's credibility sections on lake (reservoir) based recreation should be upgraded. Hauser and Holter Lakes, the other two major Missouri River impoundments in western Montana, should be included. Hauser and Holter Lakes plus the Helena Regulating Reservoir, Lake Helena, and Park Lake are all within 45 miles of Boulder, Montana. Silver Lake (near Georgetown Lake) is within 75 miles of Boulder, Montana.

We have no additional comments.

Sincerely,

Donald G. Willems, P.E.
Water Quality Bureau
Environmental Sciences Division

DGW:BB:ti



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
REGIONAL OFFICE
FEDERAL BUILDING, 1961 STOUT STREET
DENVER, COLORADO 80202

REGION VIII

January 7, 1976

IN REPLY REFER TO:
8DE

Mr. Van K. Haderlie
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 970
Bozeman, Montana 59715

Dear Mr. Haderlie:

This is in response to your letter of December 15, 1975, forwarding a copy of the Draft Environmental Impact Statement and Addendum for the Boulder River Watershed Work Plan.

As you may know, this Department's main areas of concern in responding to Draft EIS's are; (1) the consistency of an action with the comprehensive planning for the area; and (2) the action's impact on housing, particularly in an urban environment. Our review indicates that the proposed action will not require further comment in the HUD areas of jurisdiction assigned by the CEQ.

Sincerely,

David L. Witt
Director, Environmental Quality Division
Community Planning and Development

C-14

ROBERT P. RYAN
ATTORNEY AT LAW
364~~455~~ HART ALBIN BUILDING
BILLINGS, MONTANA 59101
(406) 245-6857

January 5, 1976

Mr. Robert J. Remer
Soil Conservation Service
U. S. Department of Agriculture
Federal Building
P. O. Box 970
Bozeman, MT 59715

Dear Bob:

We have received the draft of the Boulder River Watershed Work Plan together with the letter of December 15, 1975, notifying us that there will be a public meeting on January 8 in Boulder.

We appreciate having the plan and the notice. If possible, we will attend the meeting on January 8. We did, however, want to indicate that we feel that the amount programmed for site acquisition from the landowners is way too low. We doubt very much if Mr. Gilmer's land can be acquired for the figures shown for the total acreage. This is based on our knowledge of land values and of the analysis made by the FHA on land sales in the area since 1969. We don't know the basis for these estimates but if it is based on appraisals, they must be either very old or very inaccurately done. We mention this because all too often we have seen government projects including some portions of the interstate highway embroiled in condemnation litigation for long periods of time only to find the government agency involved having estimated the acquisition cost as low as 20 percent of what actually had to be paid after such action. If this should happen, it might very well harm or damage the project and after all, the amount to be spent for site acquisition is a very, very small percentage of the total of the project. I really believe that some better look should be taken at this before it becomes an immense problem. No one involved can afford to release their lands for the project at a figure less than what should be truly paid in the light of present economic conditions. My best regards.

Very truly yours,

R. P. Ryan/bas

R. P. RYAN

RPR:bas

C O P Y

Bruce Gilmer
Box 225
Boulder, MT 59632
March 1, 1976

Dear Sir:

This is a letter of protest regarding the proposed dam and irrigation project of the Boulder River Watershed in Jefferson County, Montana.

I am protesting as a taxpayer and a sportsman, who under the proposed plan are supplying at least an estimated \$3,662,822. This figure was obtained by taking the percentages of the figures on pages 1-2, 1-3, 1-4 of the Draftplan and Environmental Impact Statement. For this amount of tax dollars, the taxpayers are gaining little in return and in fact are losing 2.0 miles of road going to the Little Boulder River drainage, which is at best to be replaced by a proposed Forest Service logging road. This road will add three miles for the many sportsmen and private property owners in the area traveling into the Little Boulder drainage. This road will also pass through prime elk winter range, and the Forest Service also reserves the right to regulate use of this road during the winter to preserve the game habitat. (Pages 11-53 lines 6-7-8) Because of this the taxpayer is in danger of losing access to a large area both public and private that is now accessible the year round.

The sportsman will also lose access to the West Creek area that is southwest of the dam. There are now two jeep roads going into the area that will be either flooded or cut off. This area is also prime elk country enjoyed by many taxpayers.

The 1.6 miles of stream below the dam will be lost to the taxpayer and sportsman because, except during irrigation season, the stream will be nearly dry. (page 11-61 lines 15-20) He will also lose that stretch of stream the dam will sit on and that of the reservoir to free charge fishing since the sponsoring local organization has reserved the right to, and already plans to charge sportsmen a fee to use the reservoir for fishing, boating, and picnicing. (Page 11-13 and 11-14 line 26 and 1-5) This entire stretch of stream is one of the few places in the entire lower Boulder River drainage that has no restrictions on it. All but two ranches involved in this irrigation project have posted signs from "NO TRESPASSING WITHOUT PERMISSION" to "KEEP OUT." The latter sign was found on the property of the chairman of the sponsoring local organization. Shortly after a public meeting concerning the dam in which the sponsoring local stated that ~~land~~ land owner and sportsman relations were generally good, I took pictures of all the posted signs in the valley to prove this is untrue. In addition I fear that when the benchland of the Boulder Valley becomes irrigated land,

this will also become posted land. This would deny sportsman access to the Bull Mountain, Dry Creek, and Sage Brush Park areas.

This has already started to happen. The Quinns' Canyon Road on the Bull Mountain side of the valley was posted this year denying sportsman access.

The dam project is also supposed to benefit the fish population in the lower Boulder river by maintaining stream flow throughout the year. Every rancher every year dams the river off and completely dries it up, which is understandably hard on the fish in the river. The dam board says the extra water in the summer will prevent this, but in their book they only say that this will reduce the use of present diversions, not eliminate them. There is no guarantee of fisherman access to the stream even after the taxpayers finance the dam. (Page 11-59 line 17, page 1-21 lines 26-27)

The ranchers have done very little to improve their own existing irrigation systems or to use all existing land that is irrigatable. The efficiency percent of present systems is very low and could be improved by installing better headgates and improving the condition of the ditches. This would be at their own expense and no one seems interested in doing this. There is also the possibility of drilling wells that has not been tried in the area.

In my opinion this is a case of the rich getting richer at the expense of the not so rich, since the ranchers of the area are without a doubt the wealthiest group of people in Jefferson County.

If the dam must be built, it would be only fair that the taxpayer should truly benefit and not lose what rights and access to the areas that he now has. The sponsoring local organization must replace the Little Boulder road by the shortest possible route that would be open all year. A right of way will be cleared on the northern hillside for a power line that must be moved; this would also be a good place for the road. A jeep trail into the West Creek area should be provided. It is only fair that the sportsman be guaranteed use of all of the land irrigated by the dam.

Somehow it should be solved how to maintain the picnic areas and boat ramps without added expense to the taxpayer. After all the tax dollars it will take to build the dam, is it fair to ask the taxpayers to pay to use it?

There should also be a provision that would allow for the level of the recreation pool to be raised as the dam fills with silt, or to be raised if the quality of the recreation promised is not met. There should also be a guarantee that the river would never be completely dewatered again.

This is an honest concern of mine and my fellow sportsmen in the area. I would appreciate all of the time and consideration you can give to this project.

Very Sincerely,
Bruce Gilmer

FACSIMILE COPY OF A HANDWRITTEN LETTER RECEIVED FROM AN
INTERESTED INDIVIDUAL IN REGARD TO THE BOULDER RIVER WATERSHED PROJECT

F A C S I M I L E C O P Y

1111 8th St. W.
Billings, MT 59101
March 9, 1976

Gentlemen:

I am protesting the proposed Boulder River Watershed project. I do not feel all the facts have been researched properly or been fairly presented to the people of Jefferson County, especially to the citizens of Boulder.

It seems to me, that this nine million dollar project that will only benefit fifteen ranchers (taken from an article which appeared in the January issue of the Boulder Monitor) seems a high price to pay; especially when the taxpayers have little or no guarantees. For example, the sportsmen have no guarantee of fishing access to the Boulder River, or for that matter to the Little Boulder. Sportsmen have no guarantee that the Boulder River will not be dried up, as now is the practice of the local farmers. As I understand, the damn will be dropped so many feet during irrigation, but you can't tell me if the farmers need more water, they won't take it!

I don't feel enough consideration has been given to the environmental impact this damn will have on the surrounding wildlife. I guess the usual "do it now, and be sorry later" attitude prevails.

Many people seem to think a recreational playground will be established. I can find too many contradictions to believe this. First, there is a proposed five-horse power limit on all boats; that eliminates all waterskiers. Second, there is mosquito control. During the summer months when the water is low, leaving exposed mud, will this not create a breeding place for even more mosquitoes? Third, since this is a man-made lake, can the fish live and reproduce? If not will the taxpayers again have to pay for the restocking of fish. Forth, with Canyon Reservoir and Georgetown Lake so close, with so much to offer, will it be feasible for many sportsmen to come to this proposed damn?

Why really is this damn being built--for the farmers or the sportsmen? I know that the sportsmen will lose more than they gain and the farmers will be reaping the benefits at the cost of the taxpayers!

Angry Taxpayer,
/s/Barbara Shink

Advisory Council
On Historic Preservation

1522 K Street N.W.
Washington, D.C. 20005

March 3, 1976

Mr. Van K. Haderlie
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 970
Bozeman, Montana 59715

Dear Mr. Haderlie:

This is in response to your request of January 9, 1976, for comments on the draft environmental statement (DES) for the Boulder River Watershed Project, Jefferson County, Montana. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council has determined that this DES demonstrates compliance with Section 106 of the National Historic Preservation Act of 1966 but that it does not demonstrate compliance with the provisions of Executive Order 11593 "Protection and Enhancement of the Cultural Environment" of May 13, 1971, with regard to this proposed undertaking.

The Council notes that the Soil Conservation Service (SCS) has undertaken a cultural resources survey which has identified an old stage station which will be impacted by the undertaking. It is further noted on page II-74 of the DES that salvage of the stage station site is planned prior to construction. It is, however, unclear whether or not SCS has determined the eligibility of the stage station for inclusion in the National Register of Historic Places pursuant to Executive Order 11593, in accordance with Section 800.4(a)(2) of the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800). If this cultural resource is eligible for inclusion in the National Register, SCS should follow the remaining steps in Section 800.4 and afford the Council an opportunity to comment as appropriate. The Council requests that SCS report on the steps it has taken or proposes to take in compliance with these regulations.

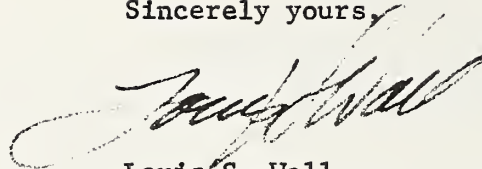
Should you have any questions or require any assistance with this matter, please contact Brit Allan Storey of the Advisory Council

C-19

Page 2
March 3, 1976
Mr. Van K. Haderlie
Boulder River Watershed Project

staff at FTS 234-4946.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Louis S. Wall", written in a cursive style.

Louis S. Wall
Assistant Director, Office
of Review and Compliance



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-76/68

APR 9 1976

Dear Mr. Haderlie:

Thank you for the letter of January 9, 1976, requesting our views and comments on the draft plan and draft environmental statement for Boulder River Watershed, Jefferson County, Montana. We have both general and specific comments arranged by section and page number.

General Comments

The Dillon District Office and the Montana State Office of our Bureau of Land Management (BLM) have discussed the analysis contained in the draft statement with you on several occasions. Many of our concerns remain unresolved. The DES lacks quantification of measurable impacts and omits the detail necessary to adequately compare alternatives. For example, most of the analysis in the Alternative Section concerns the storage reservoir. Canal alignments, design, and relevant environmental considerations need greater development and explanation. In relation to the rest of the proposal these items are lightly treated.

Planned Project

The construction of wells and development of springs are included in the work plan (page I-38) and in the environmental statement (page II-5) as conservation land-treatment measures; but the types and uses of the wells are not explained. The statement should indicate whether irrigation, dewatering, stock watering or other purposes are involved. Drainage works are mentioned as land-treatment measures intended to return surface water to the Boulder River (page II-5) but their impacts on groundwater are not evaluated.

The discussion on page II-8 page II-8A of our BLM actions if the project is implemented should be expanded. The SCS and the sponsors have been notified several times that the land involved in the recreation development areas is available for general recreation use and also that recreation development would be a



separate action not dependent upon the reservoir application. Subletting under a Recreation and Public Purpose Act lease is not allowed, yet the DES implies that the sponsors will sublease or transfer recreation responsibilities. The section on BLM actions also discusses the existing mining claim and the designation of a portion of the project area as a known geothermal area yet no additional detail is given in the remainder of the DES on these two items. Mining and geothermal activities should be treated in the description of the environment and impacts on them should be analyzed.

Paragraph number 3, page II-14, sentence 2. This states that 12 cfs will be bypassed at the irrigation structure on the Boulder River. It has been our understanding (and is depicted in Figure 6 of the EIS) that approximately 21 cfs will be bypassed at this point during the irrigation season in average water years and that a minimum of 12 cfs will be bypassed during low water years. In addition, on page I-10 of the Work Plan, it is said that releases in "average" years are expected to exceed 12 cfs. This entire paragraph may need expansion and/or clarification.

Paragraph number 5, page II-14. We don't think this release should necessarily be limited to 10 cfs as stated. The average flow of this stream is approximately 21 cfs and there may be times when it would be desirable to release more than 10 cfs through the irrigation outlet works. Because a project objective is to enhance the Boulder River fishery, more analysis of flow is needed. Since riverside lands are in private or State ownership, the predicted increase of 800 fisherman days, without additional access to the river should be explained.

Environmental Setting

Treatment of the hydrology and geology of the Boulder River Valley should be much more extensive, particularly since the primary objective of the project is to furnish water to lands that presently are irrigated and, in part, nearly waterlogged. The thickness and hydrologic characteristics of alluvial fill in the Boulder River Valley should be discussed. Lines 18-19, page II-18, identify the valley fill as "unconsolidated alluvial and lake bed materials," but the thicknesses are not given. Line 23 notes the presence of coarse fan deposits and fine gravel pediment veneers, but again gives no thickness figures. A detailed analysis of these materials is needed. Specifically, the

saturated thicknesses and transmissivities or permeabilities of the individual or aggregate deposits should be presented. A discussion of the observed and potential well yields from the valley fill would be helpful in evaluation of the possibility of using groundwater instead of water from the Little Boulder for irrigation. The statement (page II-24, lines 13-14) that identifies the fill as capable of furnishing "limited" water should be quantified. A saturated thickness map of the valley fill would be useful in determining the fill's potential as an aquifer, and a depth-to-water map would identify waterlogging problems that now exist. On page II-19, lines 7-9, the sub-irrigated cropland and other criteria show that waterlogging already is a problem. What will happen to these wet areas with the planned irrigation changes? The discussion on page II-24, lines 9-11, indicates that the small streams lose their water where they cross the benchlands--that they recharge the valley fill--but the discussion on page II-24, lines 19-21 blames excessive irrigation and spring floods for high water-table conditions along the flood plain. Early-season irrigation is also blamed (page II-44, lines 24-26) for contributing to the high water-table conditions on the valley bottoms. How long does the high water-table persist, and how will additional irrigation affect this situation?

The quality of groundwater in the project area does not seem to have been considered; however, pollution of the Boulder River by heavy metals from mining operations above Boulder is mentioned (page II-23). Effects of the Little Boulder River impoundment and water-use schedule on the quality of groundwater in the alluvium of the Boulder River Valley should also be considered, inasmuch as groundwater recharge to the alluvium of Little Boulder River below the dam will be reduced (page I-51; WWP) and distribution of impounded water from the reservoir will alter the groundwater/surface water regimen.

Boulder River Watershed investigations did not consider mining or mineral resources in the draft plan. The Soil Conservation Service addressed them in the draft statement but it failed to conduct sufficient mineral resource studies or discuss future production potential. For example:

On page II-20, the SCS states that "in the past, part of the lower Little Boulder Watershed (98 acres) was involved in a hydraulic gold mining operation (Chinese Diggings). Most of this area is in the reservoir basin." On page II-25, the draft statement mentions that "Placer mining operations on the Little Boulder in

the proposed reservoir area were active from the late 1800's to the early 1940's.... Recent private investigations have shown that some gold is present in nearby gravel deposits. These deposits are covered by deep overburden, making recent mining attempts unsuccessful." Did these private investigations thoroughly cover all of those lands that the reservoir will inundate?

The draft statement reports on page II-25, that "Abundant deposits of sand, gravel, and impervious clay materials are available throughout the Boulder Valley. Excellent sources of durable rock are available in the mountainous areas of the watershed." The extent and location of these deposits should show up on environmental statement maps, and an evaluation of their potential should accompany these maps.

On page II-25, the report states that "Extensive lode deposits have been mined in the Elkhorn Mountains. Mining began in 1875 and most of the activity has been in the vicinity of the village of Elkhorn. The mines have produced silver, lead, gold, zinc, and copper valued at \$32 million. Mines in the area are operated intermittently at the present time. Placer gold deposits have been developed in numerous areas in the watershed." Again, SCS should both delineate these deposits on maps, and show their present production and future potential.

The Boulder, Elkhorn, Golconda, State Creek, and Whitehall mining districts extend into the watershed. Likewise, the Elkhorn Creek placer on Elkhorn Creek and the Wilson Creek placer on Little Boulder River at least lie partially within the study area. Logically, the SCS should discuss each of these separately.

The following publication describes mineral resources in Jefferson County, Montana: Roby, R. N., W. C. Ackerman, F. B. Fulkerson, and F. A. Crowley, "Mines and Mineral Deposits of Jefferson County, Montana," Montana Bur. Mines and Geol., Bull. 16, 1960, 122 pp.

The Department's Bureau of Mines, Intermountain Field Operation Center, Denver, Colorado can supply information for this section.

We note that correspondence concerning an old stage station to be destroyed by the proposed excavation has been directed to the State Historic Preservation Officer. The final environmental statement should contain the results of any such consultations to determine whether this or any other property is in the process

of nomination to the National Register and whether other significant cultural resources exist or have a reasonable probability of being found in the project's area of potential adverse impact on such resources.

The statement should contain information to show that all significant cultural resources within the project's zone of potential adverse impact to such resources have been identified. The fact that such resources are not now known to the State Historic Preservation Officer, the Montana Historical Society, or the Department of Anthropology of the University of Montana should not be used to support the conclusion that such resources do not exist. We suggest that significant historic structures associated with the old Elkhorn mining community may exist in the area.

On page II-74, we note "The Montana Statewide Archeological Survey" has surveyed the dam site and the reservoir area. However, the draft statement should indicate whether the surveys encompass all affected areas identified on pages I-11 and I-12, including borrow areas, access road alignments, and powerline rights-of-way.

The final statement should indicate the magnitude and significance of impacts on all properties listed on or eligible for listing on the National Register. Compliance with Section 106 of the National Historic Preservation Act of 1966 and the procedures of the Advisory Council on Historic Preservation (36 CFR 800) should be evidenced in the statement.

Water and Related Land Resource Problems

It is difficult to determine how the project will contribute to balancing ranch operations (page II-41) without causing environmental degradation. Converting bottomland into pasture will impair riparian vegetation, especially if numbers of livestock are increased. The secondary impacts of this action on wildlife and fisheries are not mentioned. It is doubtful if the proposal will correct all "unbalanced" ranching operations. This is more likely a result of land ownership patterns rather than cropland or pastureland which may be developed or improved by the project.

The discussion on page II-45 of recreational problems implies that the population within 50 miles of Boulder was used as the recreation market area. The statement is made that there is a

lack of flat water recreational resources in and around Boulder. The Montana State Outdoor Recreation Plan does not identify a need for additional flat water recreation resources in Planning Region 8 - the region in which Boulder lies. This is due primarily to the existence of Canyon Ferry Reservoir in the Planning Region. Because Canyon Ferry Reservoir offers a wide variety of water-based recreation opportunities, is readily accessible to populations in both Helena and Butte, and will often be a preferable recreation alternative to these populations, it is not realistically appropriate to use the population within 50 miles of Boulder to compute potential recreation use. Because of geographic, regional, cultural, or habitual preferences, it is probable that less than one-third of the potential users from Helena and an even smaller percentage from Butte would use the Boulder reservoir.

The annual estimated use of reservoir recreational facilities is 35,130 visitor days of general recreation with fishermen visits estimated at 8,340 (page II-54). We believe these figures are high. Because of a difficulty of interpreting the estimated recreation use figures, a brief discussion of the definitions and methodology used to obtain the estimates should be provided in the final statement. Regardless of the number of potential visitor days, the impact of that use upon the environment and, in particular, community services, should be treated in detail.

In the discussion on page II-46, lines 12-13 mention pollution abatement after (line 4) mentioning heavy metal pollution. Nowhere in the proposed action is found any remedy for heavy metal pollution. The heavy metals are specifically identified as coming down the main Boulder River; the dam and reservoir proposed will have no effect on the source of the metals. Instead, (page II-52, lines 10-15) irrigation returns might dilute heavy metals in the summer but storage of irrigation water in the reservoir in winter will result in an increase in heavy metals pollution. Therefore, the amounts of heavy metals would not be changed; their concentrations would be. Under "Alternatives" (page II-64, lines 8-10) it is suggested that the presence of heavy metals is not going to be affected by the proposed project.

Impacts

The discussion on page II-8 indicates that irrigation releases will result in an average annual drawdown of 36.3 feet, and a

maximum drawdown of 49 feet. Because portions of the recreation season and the irrigation season are concurrent, the impacts of drawdown on recreation use should be analyzed in the environmental impact section. The analysis of impacts should also include the effect of the drawdown on the fishery.

On page II-37, a discussion is provided of the Forest Service campground 4.3 miles above the proposed dam site, yet no information is provided in the environmental impact section (pages II-48 to II-63) on the probable impacts of the proposal on this facility. Such information should be included in the final statement.

We question the contention that sedimentation and erosion will be reduced (page II-58) by changing from dry cropland to irrigated, particularly since land slopes of up to 8% will be cropped, and surface flood irrigation will continue on part of the croplands. No estimates are made of the amount of land to be irrigated by sprinklers in the future nor of timeframes to change from flood type to sprinkler irrigation. If sprinkling will contribute to increased return flow, how will a reduction in high water table conditions be attained? What was the basis for projecting irrigation groundwater return flow to the Boulder? Is it probable that return flow will occur in August, considering soils permeability and aquifer transmissivity?

Under Favorable Environmental Impacts (page II-58), line 11 indicates that the project would reduce high water-table conditions on the bottomlands. Just how this would be accomplished should be spelled out in the text. The possibility of installing drainage ditches above the bottomlands to intercept groundwater is not mentioned in the report, but interceptor ditches may be the only feasible way of controlling groundwater return flows to the river. Relief wells may also be required. A study of an area that is hydrologically similar to the Boulder River Valley was made by Moulder and Kohout in the early 1950's. You may wish to refer to their report, "Ground-water factors affecting drainage in the First Division, Buffalo Rapids Irrigation Project...", published in 1958 by the U.S. Geological Survey as Water-Supply Paper 1424.

The DES does not treat the effects of secondary impacts such as the road rerouting through game winter range, the closing of the two land fill dump sites and the rerouting of the power line (page II-9). The road relocation will, for instance, require

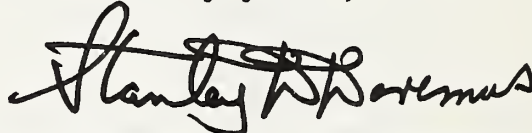
upgrading of the road leading to the May Day mine. This will entail visual and wildlife impacts on the May Day road. The visual impacts of the powerline relocation should also be mentioned.

The area now under Recreation and Public Purpose lease to the Boulder River School and Hospital is a quiet, secluded spot among willows along a slow, winding stream. The patients have the area almost completely to themselves with little or no conflicting use from other recreational users. The proposed project would move this use into or near an area planned for general recreation development. Is relocation of the Boulder River School's recreation facilities to an area adjacent to a proposed heavy use area feasible or in the best interests of the patients? Would the semi-secluded nature of the present development and the type of environment be of greater benefit to the patients? These social impacts should be covered in the DES.

The sections, "Adverse Environmental Impacts," "Short-Term versus Long-Term Use of Resources," and "Irreversible and Irretrievable Commitments of Resources," have not addressed the loss of mineral resources or the production potential within the study area if the proposed project is constructed.

We hope these comments will be of assistance to you.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Stanley W. Havens". The signature is fluid and cursive, with the first name "Stanley" being more prominent.

Deputy Assistant Secretary of the Interior

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APPENDIX D

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